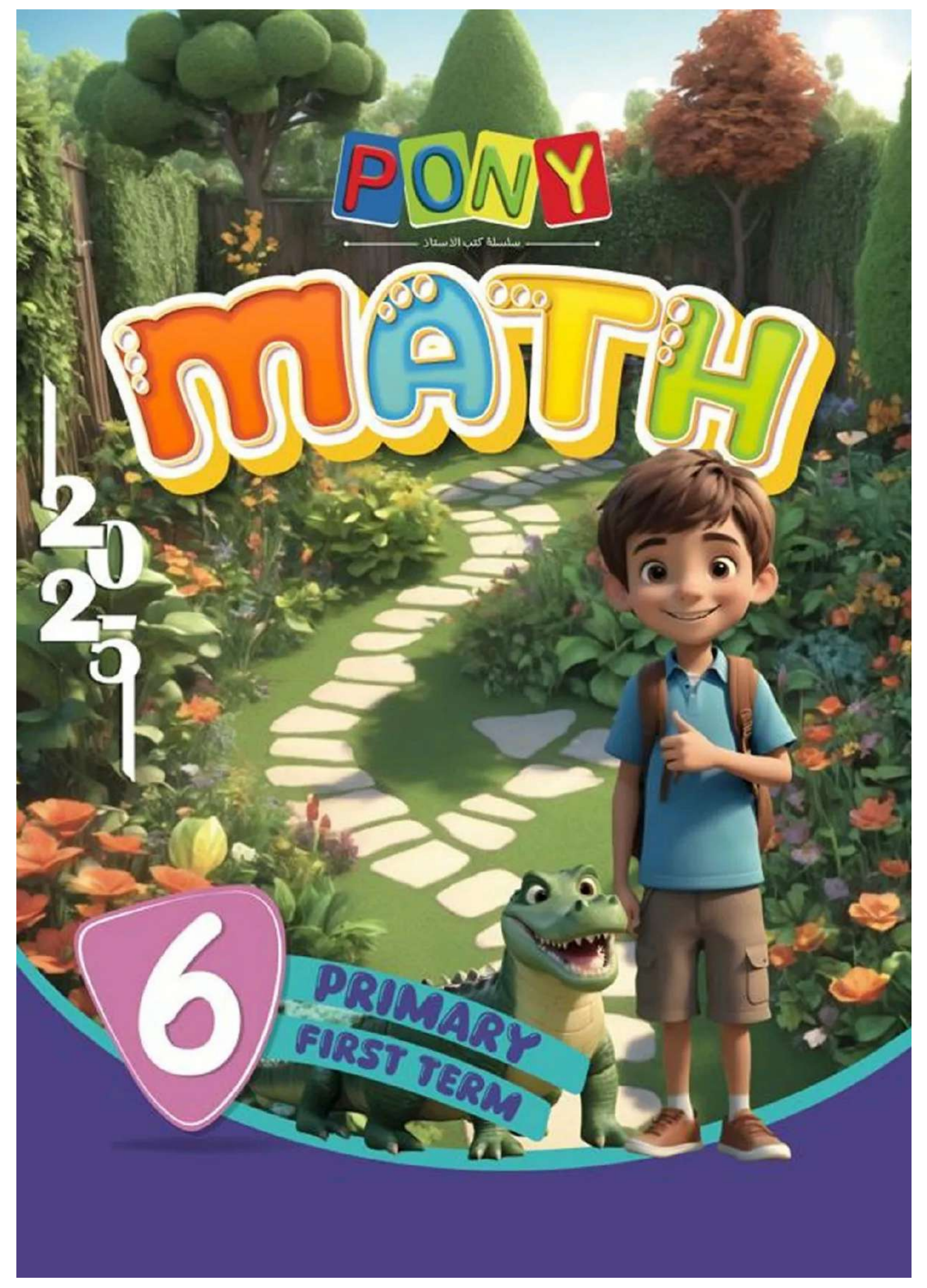

PONY
سلسلة كتب الاستاذ
MATH
2025
6
PRIMARY
FIRST TERM

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Unit 1 Divisibility, Factors, and Multiples



Concept 1.1 Divisibility, GCF, and LCM

Lesson 1 Divisibility

Learning Objective:

By the end of this lesson, the student will be able to:

- Deduce divisibility by 2, 3, 4, 5, 6, and 10.

Lesson 2 Factorizing a Number to Its Prime Factors

Learning Objective:

By the end of this lesson, the student will be able to:

- Decompose a number into prime factors to find the greatest common factor and the least common multiple.

Lesson 3 Writing Expressions Using the GCF

Learning Objectives:

By the end of this lesson, the student will be able to:

- Write mathematical expressions that contain the greatest common factor.
- Imagine how a numerical expression that represents two integers in the form of a multiple of the sum of two integers can be represented in life position.

Lesson 4 Analyzing Least Common Multiples

Learning Objectives:

By the end of this lesson, the student will be able to:

- Analyze the operations of adding and subtracting fractions and find the product of these operations.
- Use the least common multiple to form a common denominator.



Divisibility

Remember

- The odd numbers are: 1 , 3 , 5 , 7 , 9 , 11 , ………………….
- The even numbers are: 0 , 2 , 4 , 6 , 8 , 10 , 12 ………………….

Divisibility

15 ÷ 3 = 5 R 0 So, 15 is divisible by 3

15 ÷ 2 = 7 R 1 So, 15 is not divisible by 2

Any number is divisible by another, if the remainder of the division operation is zero.

1 **Complete the following table:**

	Division	Quotient	Remainder	Divisible/ Not Divisible
Ex.	45 ÷ 5	9	0	45 is divisible by 5
Ex.	25 ÷ 4	6	1	25 is not divisible by 4
a	60 ÷ 7	8	4	60 is not divisible by 7
b	35 ÷ 4	8	3	35 is not divisible by 4
c	28 ÷ 7	4	0	28 is divisible by 7
d	120 ÷ 4	30	0	120 is divisible by 4
e	29 ÷ 5	5	4	29 is not divisible by 5
f	18 ÷ 6	3	0	18 is divisible by 6

Theme 1

Determine Divisibility Without Performing Division

Divisibility by 2

- A number is divisible by 2 if:

Its Ones digit is (0 , 2 , 4 , 6 or 8) "an even number"

For example: 78 , 292 , 1,654 are divisible by 2

Even Numbers

Divisibility by 3

- A number is divisible by 3 if:

The sum of its digits is divisible by 3 without a remainder. In other words, the sum of the digits is a multiple of 3, such as 0, 3, 6, 9, and so on.

For example: **The number 582 is divisible by 3,**
because 5 + 8 + 2 = 15, and 15 is a multiple of 3.

Divisibility by 4

- A number is divisible by 4 if :

The Ones and Tens digits of the number are divisible by 4, or if the number ends with '00'.

In other words, its Ones and Tens digits should be multiples of 4, such as 0, 4, 8, 16, etc.

For example:
- **5,124 is divisible by 4** because 24 is divisible by 4.
- **300 is divisible by 4** because its Ones and Tens digits are '00'.

Divisibility by 5

- A number is divisible by 5 if :

Its Ones digit is either 0 or 5.

For example:
- **870 is divisible by 5** because its Ones digit is 0.
- **2,635 is divisible by 5** because its Ones digit is 5.

Divisibility by 10

- A number is divisible by 10 if:

  Its Ones digit is 0 .

For example: 360 , 2,130 is divisible by 10 **because** its Ones digit is 0.

Divisibility by 6

- A number is divisible by 6 if it is divisible by both 2 and 3.

or, the number whose Ones digit is even and the sum of its digits is divisible by 3 is divisible by 6.

For example:

- **102 is divisible by 6:**

  because its Ones digit is 2, which is even, and the sum of its digits (1 + 0 + 2) is divisible by 3.

- **375 is not divisible by 6:**

  because its Ones digit is odd (Not divisible by 2) and the sum of its digits (3 + 7 + 5 = 15) is divisible by 3.

2 **Circle the number which is divisible by 2:**

(30)	65	97	(54)	(258)
45	(212)	127	641	(654)
(26)	151	(368)	(6,530)	4,261

3 **Circle the number which is divisible by 3:**

(45)	(36)	28	(456)	2,005
154	368	554	(1,002)	12,748
(558)	652	100	58	(10,002)

4 **Circle the numbers which are divisible by 5:**

(45)	36	(250)	156	558
154	(830)	(945)	(630)	354
101	(2,005)	12,748	55,551	2,003

5 **Use the following numbers to complete:**

335 342 531 250 315 702 600

(a) The numbers which are divisible by 2: 342 , 250 , 702 , 600

(b) The numbers which are divisible by 3: 342 , 531 , 315 , 702 , 600

(c) The numbers which are divisible by 5: 335 , 250 , 315 , 600

(d) The numbers which are divisible by 6: 342 , 702 , 600

(e) The numbers which are divisible by 10: 250 , 600

6 **Complete the following table using (✓) or (✗):**

	Number	Divisible by...					
		2	3	4	5	6	10
Ex.	45	✗	✓	✗	✓	✗	✗
(a)	32	✓	✗	✓	✗	✗	✗
(b)	24	✓	✓	✓	✗	✓	✗
(c)	30	✓	✓	✗	✓	✓	✓
(d)	126	✓	✓	✗	✗	✓	✗
(e)	130	✓	✗	✗	✓	✗	✓
(f)	120	✓	✓	✓	✓	✓	✓
(g)	456	✓	✓	✓	✗	✓	✗



The relationship between divisibility and (factors & multiples):

Ex. **The factors of 12** are 1, 2, 3, 4, 6 and 12.

So, the number 12 is divisible by any of these factors,

Ex. **The multiples of 5** are 0, 5, 10, 15, 20, ...

So, any of these multiples are divisible by 5,

Therefore, factors and multiples can be used to determine numbers that are divisible without remainder.

Ex. 25 is divisible by 5 because:
25 is a multiple of 5 or 5 is a factor of 25.



10

1 Choose the correct answer:

a .... is divisible by 3. (2,134 or 1,026 or 146 or 37)

b .... is divisible by 10. (1,024 or 2,009 or 6,900 or 105)

c .... is divisible by 4. (54,653 or 7,593 or 836 or 4414)

2 Answer the following:

a Any number is divisible by itself, except ......0...... .

b Any number is divisible by 5 if its Ones digit is ......0...... or ......5...... .

c The smallest number which is divisible by 2 and 3 is ......6...... .

d The smallest 2-digit number and divisible by 4 is ......12...... .

e Write down three numbers that are divisible by both 3 and 5 (common multiples). ......15...... , ...30...... , ...45...... .

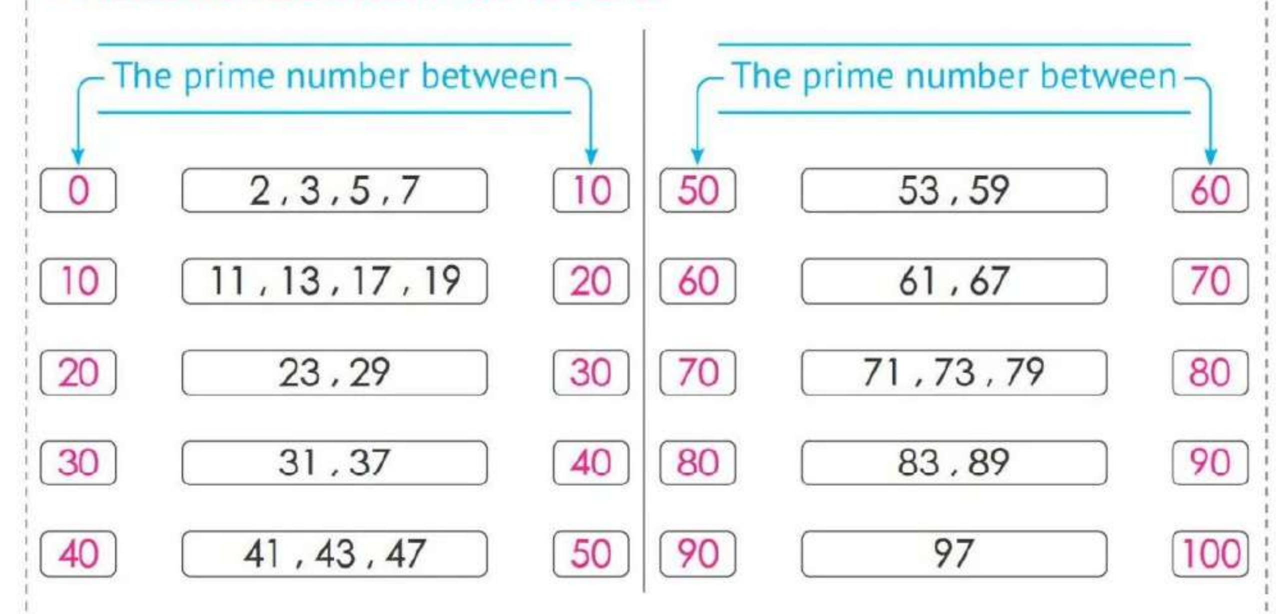


Factorizing a Number to Its Prime Factors

Remember

The prime number: Is a number greater than one and has only two factors, one and the number itself.

- All prime numbers are odd, except 2.
- The smallest prime number is 2.
- The only even prime number is 2.
- The smallest odd prime number is 3.
- 1 is neither a prime number nor a composite number.
- Prime numbers less than 100 are:



The prime number between			The prime number between		
0	2 , 3 , 5 , 7	10	50	53 , 59	60
10	11 , 13 , 17 , 19	20	60	61 , 67	70
20	23 , 29	30	70	71 , 73 , 79	80
30	31 , 37	40	80	83 , 89	90
40	41 , 43 , 47	50	90	97	100

- Any number is a factor and a multiple of itself, except zero.

Prime factorization

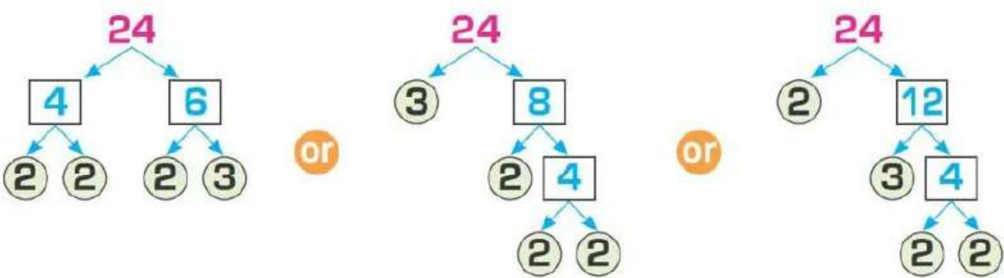
Means writing the composite number as the product of prime numbers.

Ex. Factorize 24 into its prime factors:

1. Choose two numbers whose product is 24 (1 should not be used).
2. Circle the prime numbers and leave them, then continue factorizing the composite numbers.
3. Stop when all numbers become prime numbers.

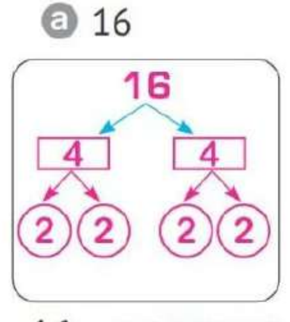
Note that: All the following are true, and we get the same result:

24 = 2 X 2 X 2 X 3



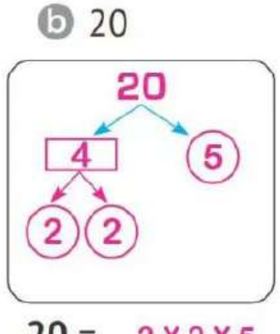
1 Factorize each number into its prime factors using the factors tree:

ⓐ 16



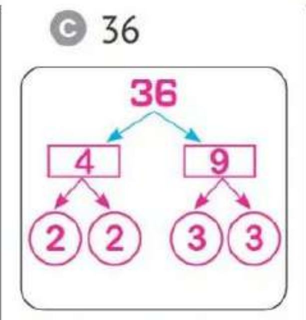
16 = 2 X 2 X 2 X 2

ⓑ 20



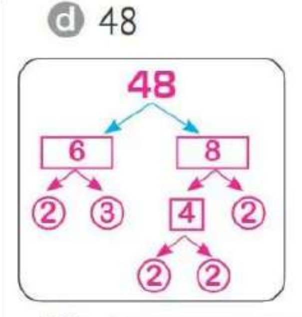
20 = 2 X 2 X 5

ⓒ 36



36 = 2 X 2 X 3 X 3

ⓓ 48



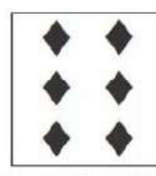
48 = 2 X 2 X 2 X 2 X 3

Venn Diagram

Is a closed shape contains elements (things) in it.

For example:





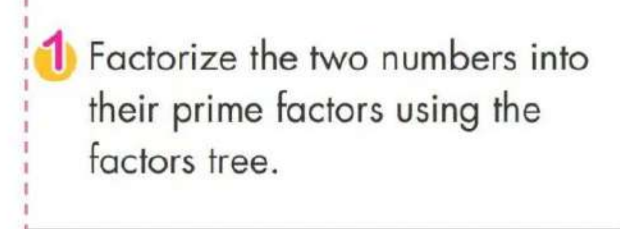
1 2
3 4

a b
c d

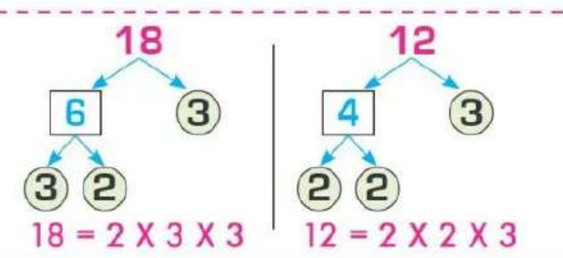
Find the GCF and LCM Using a Venn Diagram

We can find the GCF and LCM of two numbers using a Venn diagram by following these steps:

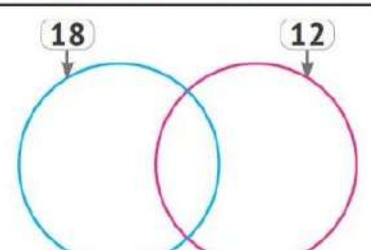
Ex. **Find the GCF and LCM for 18 and 12 using a Venn diagram:**



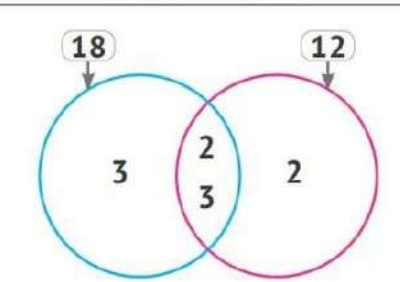
1. Factorize the two numbers into their prime factors using the factors tree.



2. Draw two intersecting circles, each circle contains the prime factors of one of the two numbers.



3. Place the prime factors for each number in its circle so that the common prime factors of the two numbers are in the common part between the two circles.



4. **The greatest common factor** of the two numbers is the product of factors presented in the common part between the two circles.

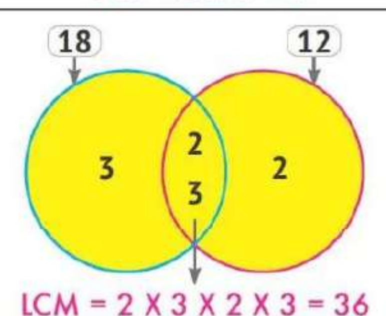
GCF = 2 X 3 = 6

18 12 3 2 3 2

GCF = 2 X 3 = 6

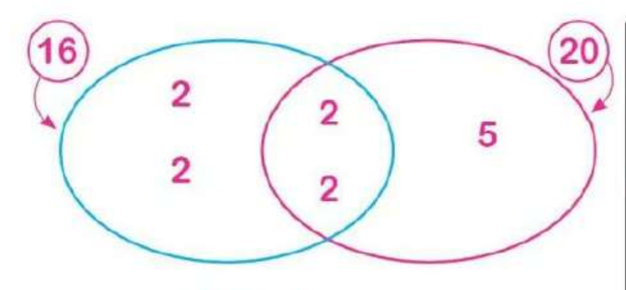
5. The least common multiple of the two numbers is the product of all the factors in the two circles.

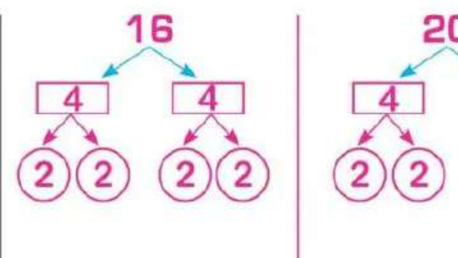
LCM = 2 X 3 X 2 X 3 = 36



2 Find the GCF and LCM of the following numbers:

ⓐ 16 and 20

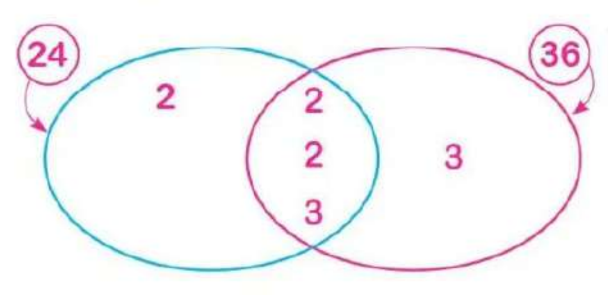


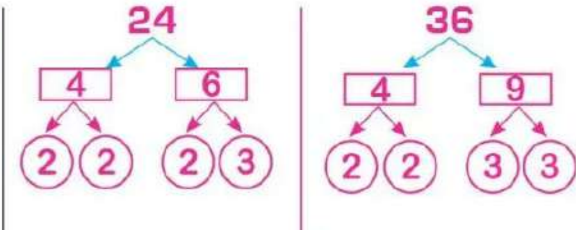


- GCF = 2 X 2 = 4
- LCM = 2 X 2 X 2 X 2 X 5 = 80

- 16 = 2 X 2 X 2 X 2
- 20 = 2 X 2 X 5

ⓑ 24 and 36

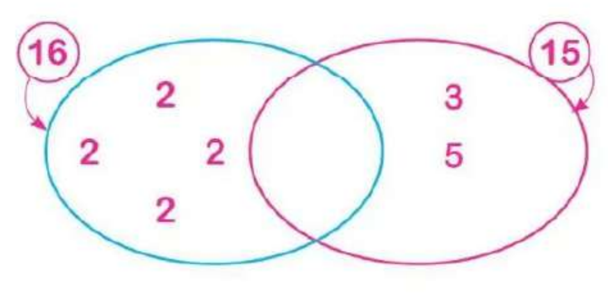


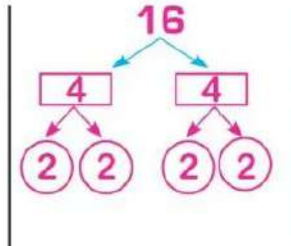


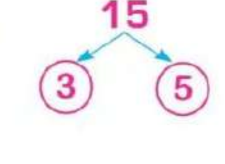
- GCF = 2 X 2 X 3 = 12
- LCM = 2 X 2 X 2 X 3 X 3 = 72

- 24 = 2 X 2 X 2 X 3
- 36 = 2 X 2 X 3 X 3

ⓒ 16 and 15







- GCF = 1
- LCM = 2 X 2 X 2 X 2 X 3 X 5 = 240

- 16 = 2 X 2 X 2 X 2
- 15 = 3 X 5

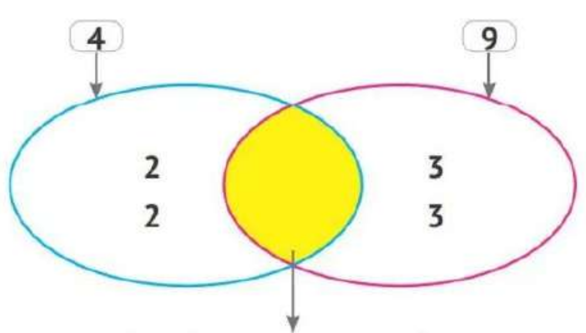
Relatively Prime Numbers

They are numbers whose only common factor is 1.

So, they are prime numbers with respect to each other.

For example: 4 and 9 are composite numbers.

$4 = 2 \times 2$, $9 = 3 \times 3$



When there is no prime factors in the common part, then

GCF = 1

- The greatest common factor of 4 and 9 is 1.
- Therefore 4 is a prime number with respect to 9.
- 9 is a prime number with respect to 4.
- 4 and 9 are relatively prime numbers.



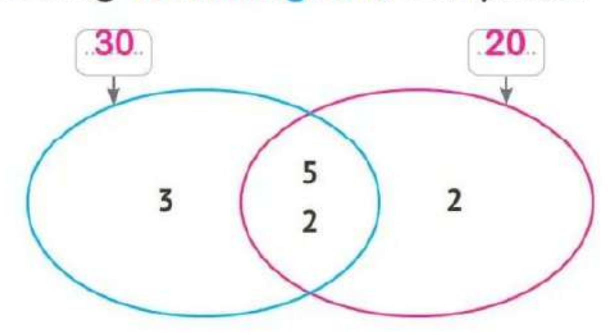
- The lowest common multiple of the relatively prime numbers is **their product**.

For example: The common multiple of 4 and 9 is $4 \times 9 = 36$.

3 Complete the following table:

	Numbers	Prime Factors	GCF	LCM	Relatively Prime Numbers (Yes or No?)
Ex.	12 , 15	12 = 2 X 2 X 3 15 = 3 X 5	3	2X2X3X5 = 60	No
a	9 , 8	9 = 3 X 3 8 = 2 X 2 X 2	1	3 X 3 X 2 X 2 X 2 = 72	Yes
b	15 , 4	15 = 3 X 5 4 = 2 X 2	1	3 X 5 X 2 X 2 = 60	Yes
c	6 , 8	6 = 2 X 3 8 = 2 X 2 X 2	2	2 X 3 X 2 X 2 = 24	No

4 Using the following Venn diagram, complete:



a The two numbers represented in the Venn diagram are 30 and 20 .

b The common prime factors of the two numbers are 2 , 5 .

c The GCF for the two numbers is 2 X 5 = 10 .

d The LCM for the two numbers is 2 X 2 X 3 X 5 = 60

e Are the two numbers relatively prime numbers? No

(Yes or No?)



10

1 Complete the following:

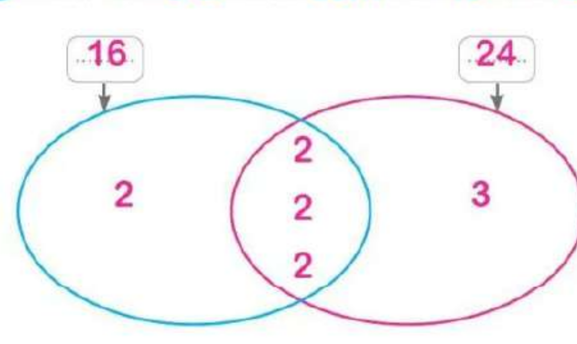
a) The **prime** number has only ....2.... factor(s).

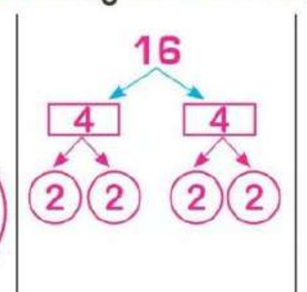
b) The **LCM** of the two relatively prime numbers is ..their product.. .

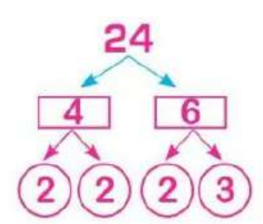
c) Two numbers are relatively prime numbers if their **GCF** is ....1.... .

2 Answer the following:

a) Find the **GCF** and **LCM** for **16** and **24** using the following Venn diagram:

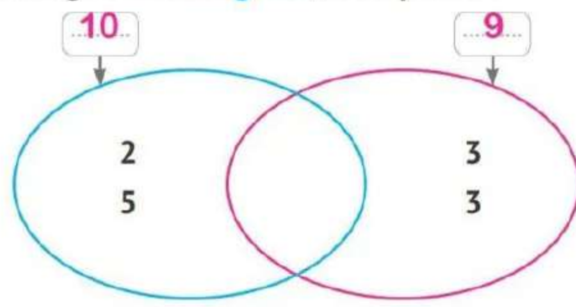






- GCF = 2 X 2 X 2 = 8
- LCM = 2 X 2 X 2 X 2 X 3 = 48
- 16 = 2 X 2 X 2 X 2
- 24 = 2 X 2 X 2 X 3

b) Using the following **Venn diagram**, complete:



1. The two numbers represented in the Venn diagram are ..10.. and ..9.. .
2. The common prime factors of the two numbers are ....None.... .
3. The GCF for the two numbers is ....1.... .
4. The LCM for the two numbers is ..2 X 5 X 3 X 3 = 90
5. Are the two numbers relatively prime number? ....Yes.... .

(Yes or No?)



Writing Expressions Using the GCF



Remember

- **The Distributive Property** states that multiplying a number by the sum of two addends is the same as multiplying that number by each addend individually and then adding those products.



$$7 \times (3 + 9) = (7 \times 3) + (7 \times 9)$$

1 Complete the following:

a) 5 X (3 + 6) = (....5.... X ....3....) + (....5.... X ....6....)

b) ....7.... X (....2.... + ...4....) = (7 X 2) + (7 X 4)

c) 8 X (....9.... + ...2....) = (....8.... X 9) + (....8.... X 2)

d) ....9.... X (4 + 6) = (9 X ....4....) + (9 X ....6....)

Writing Numerical Expressions Using the Greatest Common Factor

- The greatest common factor is used to solve real-word problems that usually involve
  - Dividing
  - Cutting things into pieces
  - Separating things into groups
  - Distributing Equally
  - Breaking

- Numerical expressions can be written to express real-world problems using the Distributive Property.

Ex. A student collected **12** bags of legumes and **8** boxes of cheese to prepare cartons of donations for the poor. Write a numerical expression that represents the largest number of cartons possible so that all cartons include the same number of the two types of food.

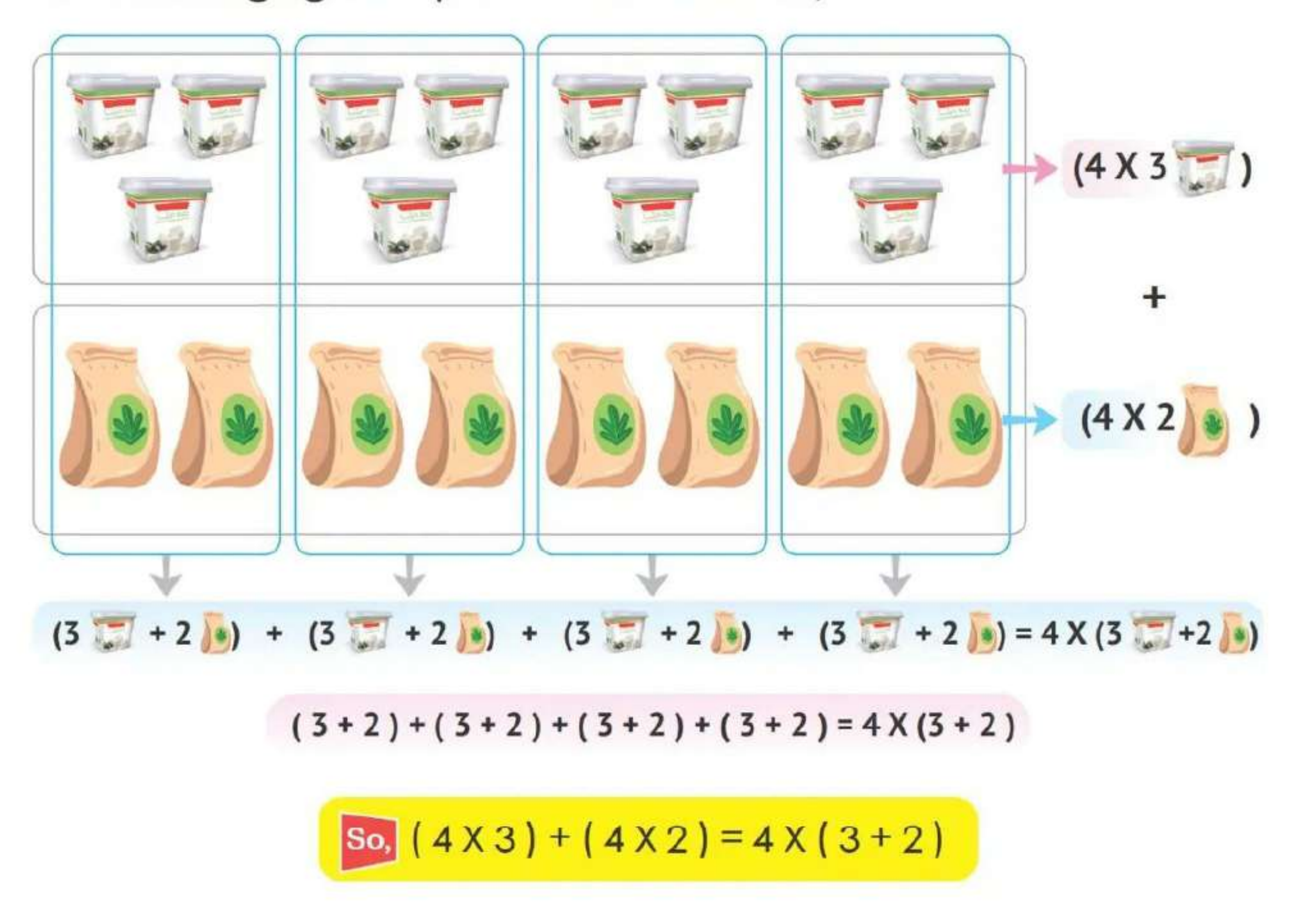
Answer To find the largest number of cartons, the greatest common factor of **12** and **8** must be found.

12 = 2 X 2 X 3
8 = 2 X 2 X 2
GCF = 2 X 2 = 4

This means that:

- The largest number of cartons is GCF = **4** cartons.
- The number of bags of legumes in each carton is **12 ÷ 4 = 3 bags**.
- The number of cheese boxes in each carton is **8 ÷ 4 = 2 boxes**.

The following figure represents the cartons,



(3 + 2) + (3 + 2) + (3 + 2) + (3 + 2) = 4 X (3 + 2)

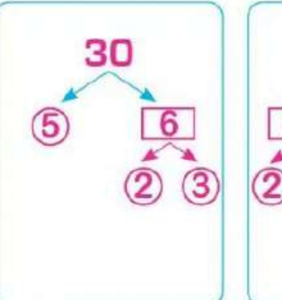
So, (4 X 3) + (4 X 2) = 4 X (3 + 2)

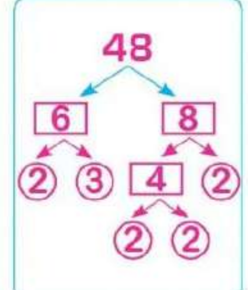
2 **Malak cooked 30 dishes of Um Ali and 48 pieces of baklava for her family. She wants to divide the desserts into boxes so that each person gets the same number of the two desserts.**
Write a numerical expression representing the largest number of boxes that she can prepare.

30 = 2 X 3 X 5

48 = 2 X 3 X 2 X 2 X 2

GCF = 2 X 3 = 6





a. The largest number of boxes (GCF) is 6 boxes .

b. Number of Umm Ali dishes in each box: 30 ÷ 6 = 5 dishes .

c. Number of baklava pieces in each box: 48 ÷ 6 = 8 dishes .

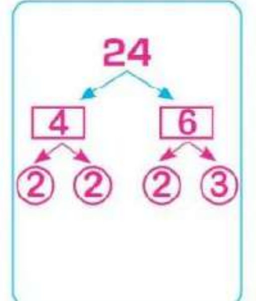
d. The numerical expression: (6 X 5) + (6 X 8) = 6 X (5 + 8) .

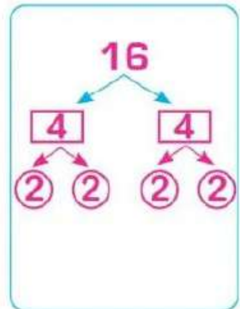
3 **Ahmed wants to grow 24 jasmine plants and 16 phil plants in his garden. Ahmed wants to plant these plants in basins so that each basin contains the same number of the two types of plants.**
Write a numerical expression that represents the largest number of basins he can plant.

24 = 2 X 2 X 2 X 3

16 = 2 X 2 X 2 X 2

GCF = 2 X 2 X 2 = 8





The numerical expression: (8 X 3) + (8 X 2) = 8 X (3 + 2)



10

1 Complete the following:

a) 5 X (7 + 2) = (5 X ....7....) + (....5.... X 2)

b) 2 X (....4.... + ...6....) = (....2.... X 4) + (....2.... X 6)

c) The GCF for 9 and 6 is ....3.... .

d) The GCF of all numbers is ....1.... .

e) 5 x (....6.... + ...8....) = 30 + 40

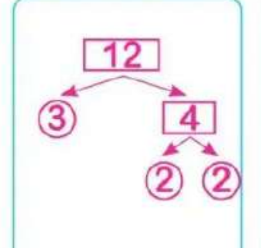
2 Answer the following:

a) Sama has 12 red pens and 15 blue pens. What is the greatest number of groups can Sama divide the pens into so that all groups contain the same number of both colors?

12 = 2 X 2 X 3

15 = 3 X 5

GCF = 3





The greatest number of groups (GCF) = 3 groups

b) Marwa divided 12 oranges and 8 candies into bags so that the bags contained the same number of oranges and the same number of candies. Write a numerical expression for this situation.

(4 X 3) + (4 X 2) = 4 X (3 + 2)

12 = 2 X 2 X 3

8 = 2 X 2 X 2

GCF = 2 X 2 = 4



Lesson 4 Analyzing Least Common Multiples

Remember

For Adding and Subtracting Fractions with Unlike Denominators By Using the LCM

Solution steps:

1. Find the **LCM** for the denominators.
2. Replace these fractions with **equivalent fractions** with a like denominator.
3. **Add** or **subtract**, then putting the answer in its simplest form if possible.

For example:

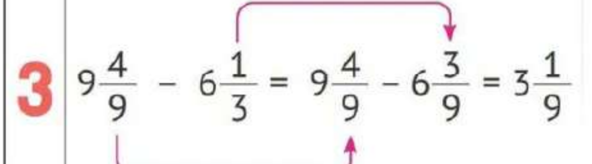
a) Add: $3\frac{3}{8} + 9\frac{1}{6}$

Note that:

1. The LCM for 8 and 6 is 24.
2. $3\frac{3}{8} = 3\frac{9}{24}$ (×3) , $9\frac{1}{6} = 9\frac{4}{24}$ (×4)
3. $3\frac{3}{8} + 9\frac{1}{6} = 3\frac{9}{24} + 9\frac{4}{24} = 12\frac{13}{24}$

b) Subtract: $9\frac{4}{9} - 6\frac{1}{3}$

Note that:

1. The LCM for 9 and 3 is 9.
2. $9\frac{4}{9} = 9\frac{4}{9}$, $6\frac{1}{3} = 6\frac{3}{9}$ (×3)
3. 

$9\frac{4}{9} - 6\frac{1}{3} = 9\frac{4}{9} - 6\frac{3}{9} = 3\frac{1}{9}$

1 **Find the result: (In the simplest form)**

ⓐ $\frac{3}{4} + \frac{5}{12} = \frac{9}{12} + \frac{5}{12} = \frac{14}{12} = 1\frac{2}{12} = 1\frac{1}{6}$

ⓑ $\frac{7}{9} - \frac{1}{3} = \frac{7}{9} - \frac{3}{9} = \frac{4}{9}$

ⓒ $2\frac{3}{8} + 1\frac{5}{6} = 2\frac{9}{24} + 1\frac{20}{24} = 3\frac{29}{24} = 4\frac{5}{24}$

ⓓ $5\frac{8}{9} - 3\frac{1}{2} = 5\frac{16}{18} - 3\frac{9}{18} = 2\frac{7}{18}$

ⓔ $8\frac{1}{5} + 2\frac{1}{3} = 8\frac{3}{15} + 2\frac{5}{15} = 10\frac{8}{15}$

ⓕ $6\frac{2}{3} - 2\frac{1}{4} = 6\frac{8}{12} - 2\frac{3}{12} = 4\frac{5}{12}$

Learn

Analyzing the Least Common Multiple

Ex. Ola made 4 trays of basbousa of the same size and cut each tray of basbousa in a different way. After the end of the party, she noticed that there was left over basbousa in each tray, as follows:

$\frac{1}{3}$ of the first tray, $\frac{1}{6}$ of the second tray, $\frac{5}{12}$ of the third tray, $\frac{1}{4}$ of the last tray.

What is the total amount of basbousa left?

$\frac{1}{3} + \frac{1}{6} + \frac{5}{12} + \frac{1}{4} = \frac{4}{12} + \frac{2}{12} + \frac{5}{12} + \frac{3}{12} = \frac{14}{12} = 1\frac{2}{12} = 1\frac{1}{6}$ trays

2 **Answer the following:**

ⓐ Maher spent $2\frac{3}{4}$ hours studying Arabic, $1\frac{1}{2}$ hours studying mathematics, and $1\frac{1}{5}$ hours studying science.

How many hours did Maher spend studying all subjects?

Maher spend $= 2\frac{3}{4} + 1\frac{1}{2} + 1\frac{1}{5} = 2\frac{15}{20} + 1\frac{10}{20} + 1\frac{4}{20} = 4\frac{29}{20} = 5\frac{9}{20}$ hours

b Galal bought a pen for $5\frac{1}{2}$ pounds, a ruler for $3\frac{3}{4}$ pounds, and an eraser for 2 pounds. How much money did Galal pay to buy these supplies?

Galal Paid $= 5\frac{1}{2} + 3\frac{3}{4} + 2 = 5\frac{2}{4} + 3\frac{3}{4} + 2 = 10\frac{5}{4} = 11\frac{1}{4}$ pounds

c Karim had $25\frac{1}{2}$ pounds, and he bought a booklet for $16\frac{1}{4}$ pounds. How much money is left with Karim?

The money left $= 25\frac{1}{2} - 16\frac{1}{4} = 25\frac{2}{4} - 16\frac{1}{4} = 9\frac{1}{4}$ pounds

d Ahmed runs for $4\frac{1}{2}$ hours a day, and Heba runs for $3\frac{1}{4}$ hours a day. What is the difference between the time they both run?

The difference $= 4\frac{1}{2} - 3\frac{1}{4} = 4\frac{2}{4} - 3\frac{1}{4} = 1\frac{1}{4}$ hour



$\frac{\quad}{10}$

1 Complete the following:

a $5\frac{1}{6} + 3\frac{1}{3} = 8\frac{3}{6} = 8\frac{1}{2}$

b $9\frac{1}{2} - 2\frac{1}{4} = 7\frac{1}{4}$

c $7\frac{3}{4} - 4\frac{7}{20} = 3\frac{2}{5}$

d $11\frac{2}{15} - 3\frac{4}{5} = 7\frac{1}{3}$

2 Answer the following:

a Attia bought $3\frac{1}{2}$ kg of oranges and $4\frac{1}{4}$ kg of bananas.
What is the total mass of fruit that Attia bought?

The total mass $= 3\frac{1}{2} + 4\frac{1}{4} = 3\frac{2}{4} + 4\frac{1}{4} = 7\frac{3}{4}$ Kg

b Hana had 12 meters of fabric, of which she used $3\frac{1}{2}$ meters to make a dress. How many meters of fabric does she have left?

The left of fabric $= 12 - 3\frac{1}{2} = 11\frac{2}{2} - 3\frac{1}{2} = 8\frac{1}{2}$ meters



Rational Numbers



Explore the Number Line

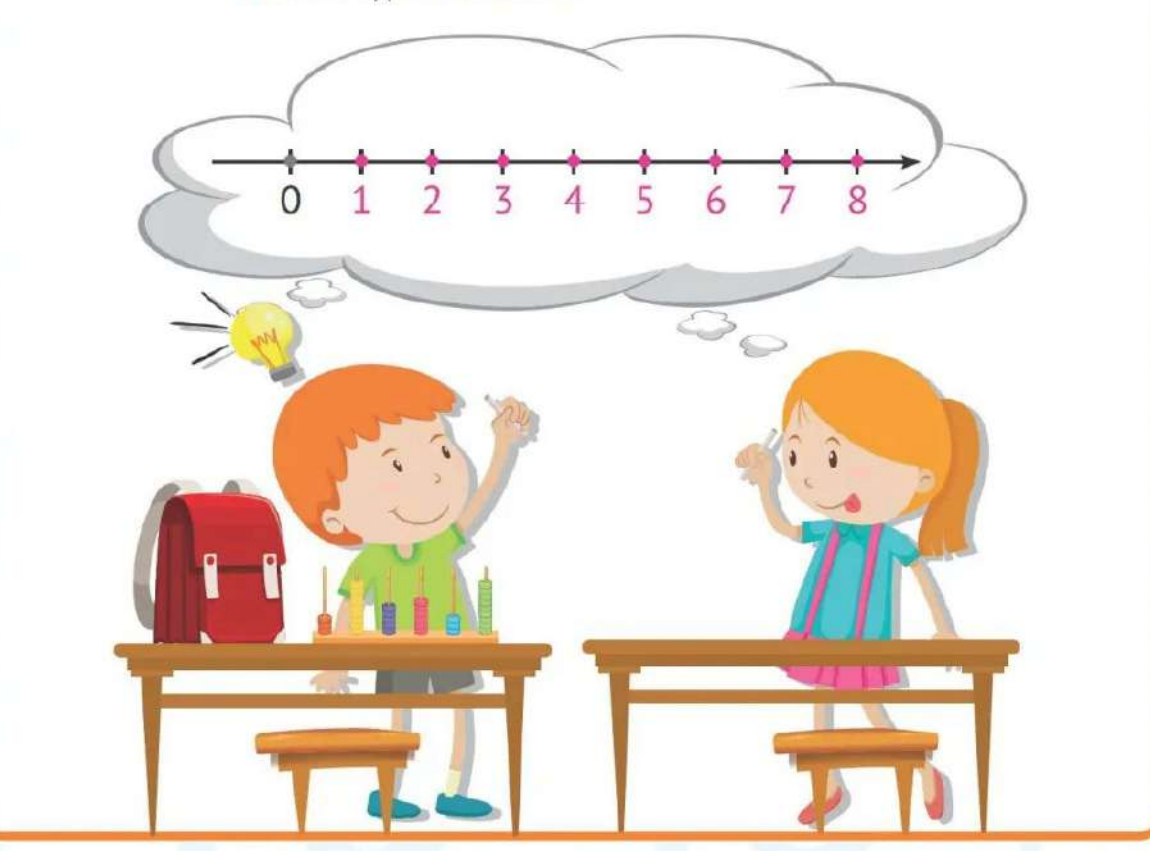
Lessons 1&2

Using a Number Line to Describe Data
Using a Number Line and Symbols to Compare Numbers

Learning Objectives:

By the end of these lessons, the student will be able to:

- Recognize the number line to include negative numbers in order to utilize them to model real-world situations.
- Plot positive and negative points on a number line and discuss relative positions.
- Discuss the relative positions by plotting positive and negative points on a number line.
- Discover opposites of numbers.





Using a Number Line to Describe Data
Using a Number Line and Symbols to Compare Numbers

Sets of Numbers

- You have studied some sets of numbers, as follows:

The Set of Counting Numbers:	1 , 2 , 3 , 4 , 5 , 6 , 7 , ...
The Set of Odd Numbers:	1 , 3 , 5 , 7 , 9 , 11 , 13 , ...
The Set of Even Numbers:	0 , 2 , 4 , 6 , 8 , 10 , 12 , ...

Now you will study:

The Set of Natural Numbers:

- They are a set of counting numbers in addition to zero.

0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , ...



The Set of Integers:

- They are numbers that do not contain decimals or fractional parts.

Integers

Negative numbers

They are numbers less than zero, preceded by a (–) sign.

Ex. –5, –58, –212, ...

Zero

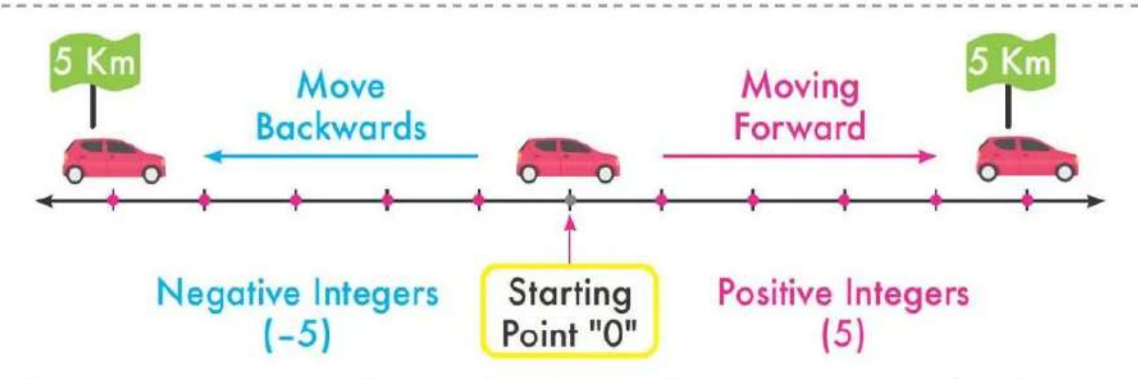
"0" is neither positive nor negative.

Positive numbers

They are numbers greater than zero and are written without a sign.

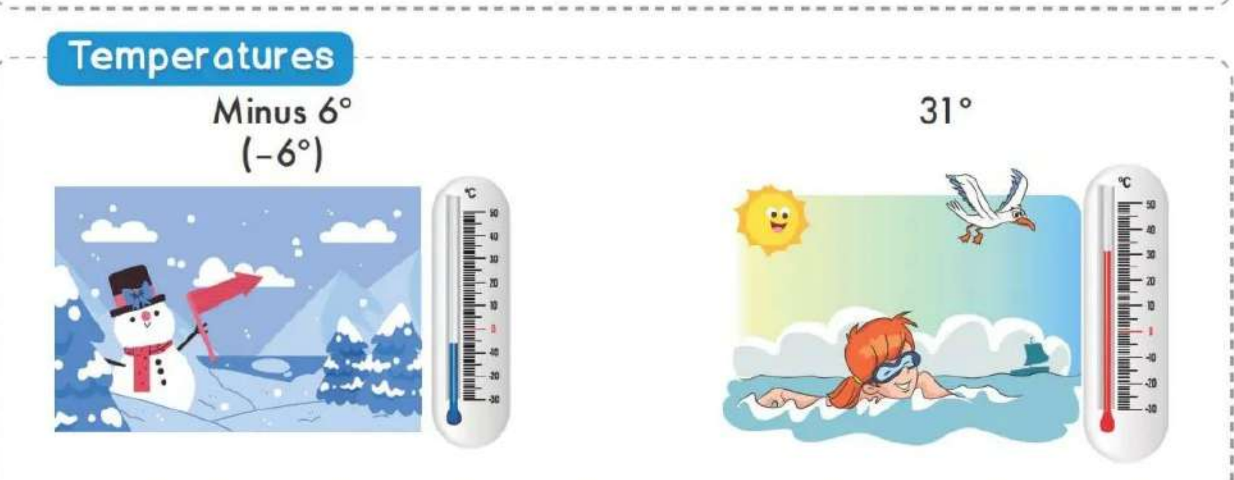
Ex. 25, 2, 157, ...

Examples Showing Integers



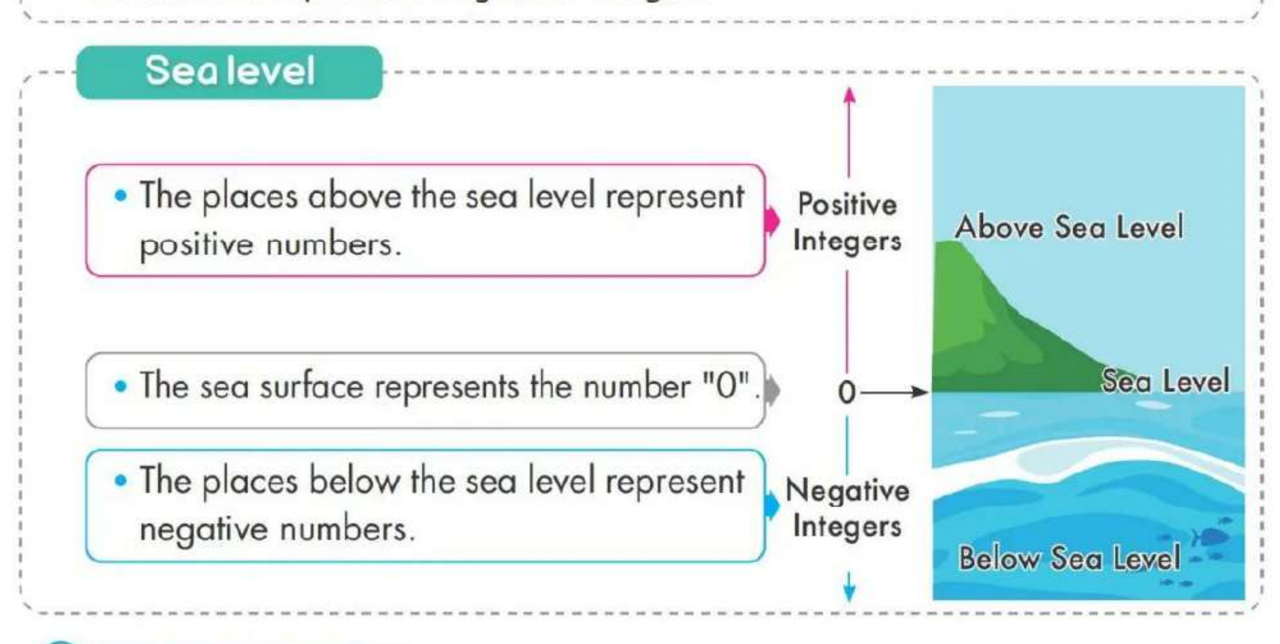
- When starting from "0", moving forward represents positive integers, and moving backward represents negative integers.

Temperatures



- Temperatures above zero represent positive integers, and temperatures below zero represent negative integers.

Sea level



- The places above the sea level represent positive numbers.
- The sea surface represents the number "0".
- The places below the sea level represent negative numbers.

Keywords

Negative			Positive		
To the left	Backward	Down	To the right	Foreword	Up
Loss	Below sea level		Profit/Gain	Above sea level	
Sub zero	Withdraw	Deep	Over zero	Deposit	High

1 **Write an integer to represent each of the following situations:**

ⓐ The value of the profit is 25 Egyptian pounds. (25)

ⓑ The value of the loss is 3 pounds. (- 3)

ⓒ The temperature is 10 degrees below zero. (- 10)

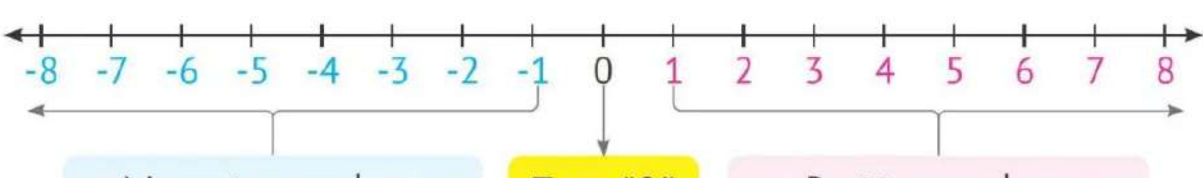
ⓓ The building's height is 12 meters. (12)

ⓔ The drop is 19 meters underground. (- 19)

ⓕ Move 4 steps back. (- 4)

Representing Integers on a Number Line

- Each integer can be represented by only one point on the number line, such that the consecutive numbers at equal distances as follows:



Negative numbers (numbers less than zero) are written to the left of zero.

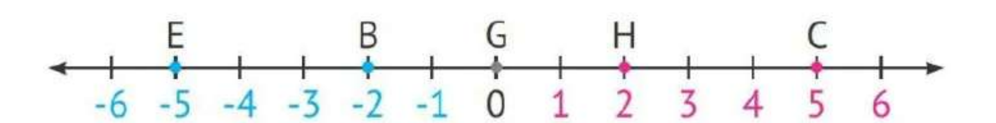
Zero "0"

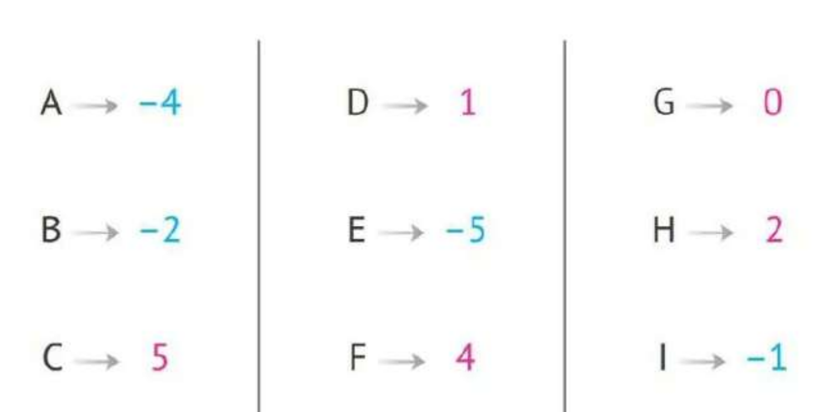
Positive numbers (numbers greater than zero) are written to the right of zero.

- Positive integers are: 1, 2, 3, 4, 5, 6, 7, 8, ...
- Negative integers are: −1, −2, −3, −4, −5, −6, −7, −8, ...

Integers extend without ending to the left and right of zero.

Ex. **Write the numbers indicated by the symbols shown on each of the horizontal and vertical number lines:**

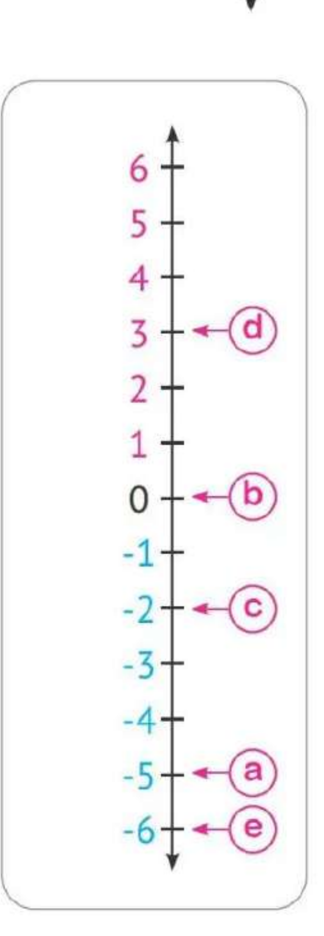




7
6
5
4 F
3
2
1 D
0
-1 I
-2
-3
-4 A
-5
-6
-7

2 **The following table shows the temperature at which some liquids freeze. Determine these temperatures on the number line shown.**

Liquids	Freezing Point (In Celsius)
a Olive oil	−5
b Fresh water	0
c Sea water	−2
d Peanut oil	3
e Orange juice	−6

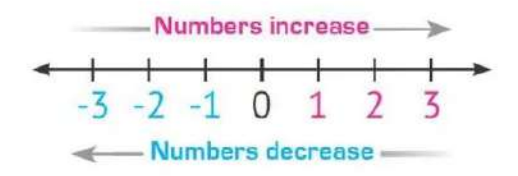


Comparing Integers Using a Number Line

- A number line can be used to compare integers for any two different numbers on the number line:

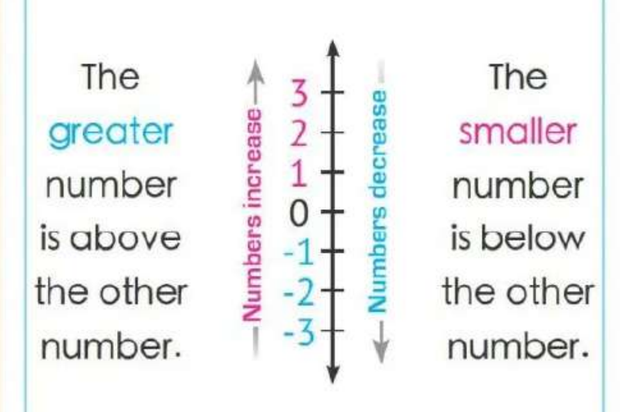
Horizontal Number Line

The greater number is to the right of the other number.



The smaller number is to the left of the other number.

Vertical Number Line



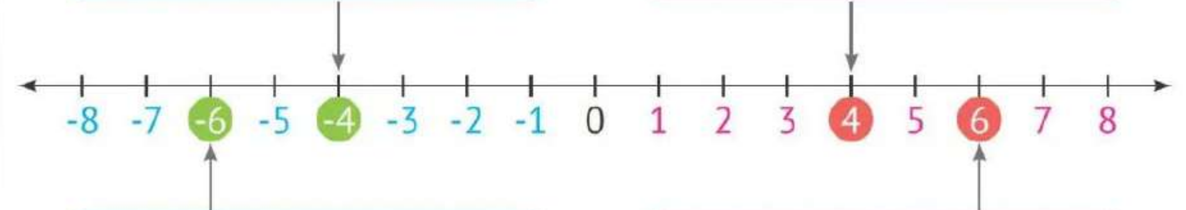
So that $\ldots < -5 < -4 < -3 < -2 < -1 < 0 < 1 < 2 < 3 < 4 < 5 < \ldots$

Ex.

Using the following number line:

-4 comes just after -5.
-4 is next to -5.
-4 is lying to the right of -5.

4 comes just before 5.
4 is the previous number of 5.
4 is lying to the left of 5.



-6 comes just before -5.
-6 is the previous number of -5.
-6 is lying to the left of -5.

6 comes just after 5.
6 is next to 5.
6 is lying to the right of 5.

3 Complete the following:

a ...-2... comes just after −3.

b 6 comes just after ...5... .

c −7 is next to ...-8... .

d ...8... is next to 7.

e ...-10... comes just before −9.

f 0 comes just before ...1... .

g −2 is the previous number of ...-1... .

h −1 is the previous number of ...0... .

Important Notes:

- The numbers **increase** from left to right and from bottom to top.
- The numbers **decrease** from right to left and from top to bottom.
- Any positive number is **greater than** any negative number.
- Zero is **less than** any positive number and **greater than** any negative number.

Negative Integers < 0 < Positive Integers

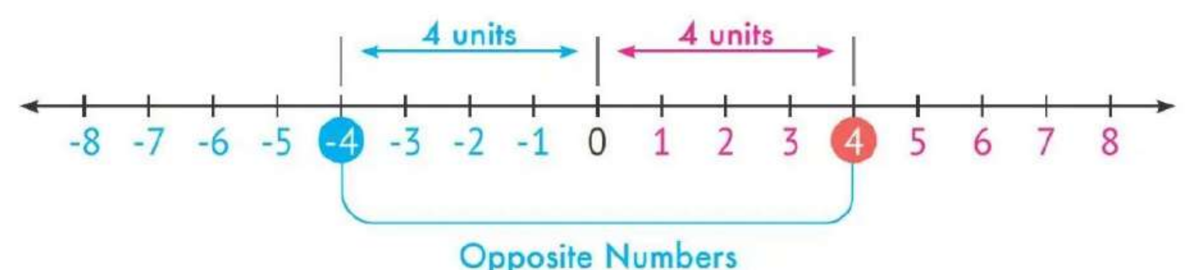
- The **smallest positive number** is 1, and the **largest positive number** cannot be specified.
- The **largest negative number** is "−1", and the **smallest negative number** cannot be specified.
- Zero is the **smallest** non-negative number and the **largest** non-positive number.

4 Compare using (<, =, or >):

a	8	<	9
b	−5	>	−7
c	−6	<	5
d	9	>	−4
e	3	>	−3
f	9	>	0
g	0	>	−10
h	−6	=	−6
i	7	=	7

Opposite Numbers (Additive Inverse)

- On the number line, any two numbers at the same distance from "0" and at two opposite locations from it are called **opposite numbers** (additive inverse).



The opposite of 4 is –4, **and** the opposite of –4 is 4.

So, 4 and −4 are **opposite numbers**.
4 and −4 are the additive inverse of each other.

5 Write the opposite of each of the following numbers:

- (a) −7 → 7
- (b) 6 → - 6
- (c) −15 → 15
- (d) 12 → - 12
- (e) 0 → 0
- (f) −45 → 45

Theme 1



10

1 Complete the following:

a) The greatest non-positive integer is ....0........ .

b) A temperature that is 4 °C below zero is written as "........-4........."

c) The opposite of −3 is ....3........ .

2 Choose the correct answer:

a) −4 > ....-7........ (2 or 0 or −3 or [−7])

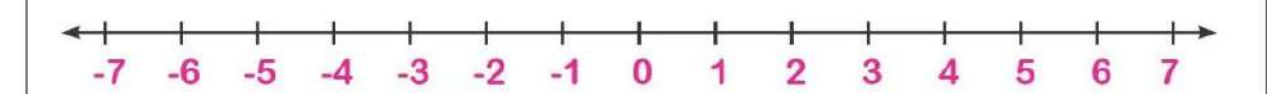
b) The integer that comes just before −3 is ....-4........ .

([−4] or 4 or −2 or 2)

c) −25 [<] 12 (> or = or [<])

3 Represent the following numbers on the number line, then arrange the following numbers in an ascending order:

3 , −6 , −3 , 0 , 6



The order: ....-6........ , ...-3........ , ...0........ , ...3........ , ...6........

Unit 2

Rational Numbers



Investigate Rational Numbers

Lessons 3&4

Analyzing Rational Numbers by Using Models
Comparing and Ordering Rational Numbers

Learning Objectives:

By the end of these lessons, the student will be able to:

- Utilize the visual of a Venn diagram to help students conceptualize the number system.
- Investigate the symmetry of the number line and the use of opposites through a real-world context of tug-of-war.
- Practice representing real-world situations as rational numbers, and then order the values from least to greatest.





Analyzing Rational Numbers by Using Models
Comparing and Ordering Rational Numbers

The set of Rational Numbers:

- Rational Numbers are all numbers that can be put in the form $\frac{a}{b}$.
- Where "a" is an integer, and "b" is an integer that is not equal to zero.

All fractions and mixed numbers are rational numbers.

For example: $\frac{3}{4}$, $\frac{5}{8}$, $3\frac{2}{5} = \frac{17}{5}$, $3\frac{1}{4} = \frac{13}{4}$

All decimals are rational numbers.

- Where they can be put in the form of a normal fraction $\frac{a}{b}$.

For example: $0.8 = \frac{8}{10}$, $0.23 = \frac{23}{100}$, $2.5 = \frac{25}{10}$, $24.08 = \frac{2{,}408}{100}$

All integers are rational numbers.

- Where they can be put in the form of a normal fraction $\frac{a}{b}$.

For example: $3 = \frac{3}{1}$, $-5 = -\frac{15}{3}$, $-12 = -\frac{12}{1}$, $8 = \frac{32}{4}$, $0 = \frac{0}{1}$

1 **Write the following rational numbers in fraction form $\frac{a}{b}$:**

ⓐ 0.75: $\frac{75}{100}$ ⓑ −45: $\frac{-45}{1}$ ⓒ 4: $\frac{4}{1}$

ⓓ 0: $\frac{0}{1}$ ⓔ $3\frac{1}{5}$: $\frac{16}{5}$ ⓕ −1.5: $\frac{-15}{10}$

2 **Write "belongs" or "does not belong":**

ⓐ $-\frac{3}{7}$: doesn't belong to set of integers.

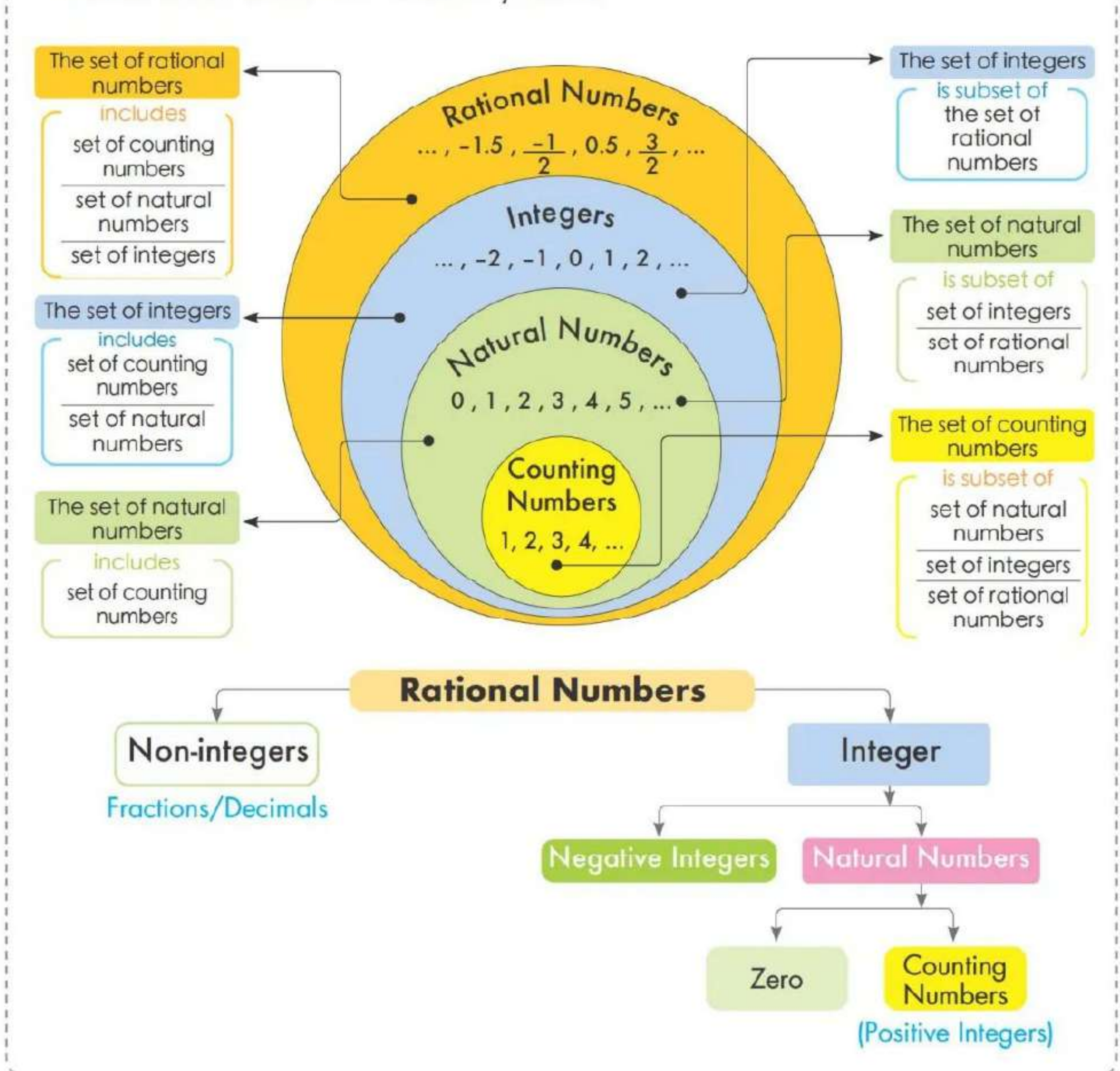
ⓑ 0 : belongs to set of natural numbers.

ⓒ −4 : doesn't belong to set of counting numbers.

ⓓ 0 : belongs to set of rational numbers.

Inclusion and Subsets

- We can represent the previous sets of numbers in the following Venn form, and we can say that:



3 Write "a subset" or "not a subset":

a) Set of integers is ....not a subset........ of set of counting numbers.

b) Set of natural numbers is ....a subset.... of set of integers.

c) Set of counting numbers is ..a subset.. of set of rational numbers.

d) Set of rational numbers is ..not a subset of set of natural numbers.



- The best subset is the smallest set that the number belongs.

4 **Classify the following numbers according to the number groups shown. Put a tick ✓:**

	Number	Counting Numbers	Natural Numbers	Integers	Rational Numbers	Best subset
Ex.	-2	✗	✗	✓	✓	Integers
a	5	✓	✓	✓	✓	connting
b	0	✗	✓	✓	✓	natural
c	-7	✗	✗	✓	✓	Integers
d	3.5	✗	✗	✗	✓	Rational
e	$\frac{3}{4-4}$	✗	✗	✗	✗	None
f	$-2\frac{1}{3}$	✗	✗	✗	✓	Rational

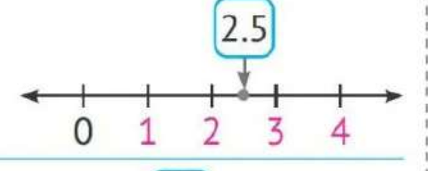
Representing Rational Numbers on a Number Line

- To determine the position of a rational number on a number line, find the two integers between which the fractions or decimals lie.

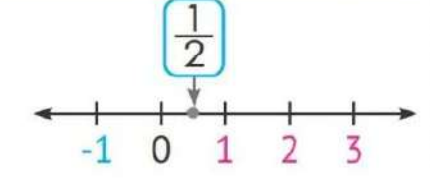
Ex. Identify the following numbers on the number line:

$$(2.5, \frac{1}{2}, -5.5, 6\frac{3}{4})$$

- 2.5 lies between the two integers 2 and 3.



- $\frac{1}{2}$ lies between the two integers 0 and 1.



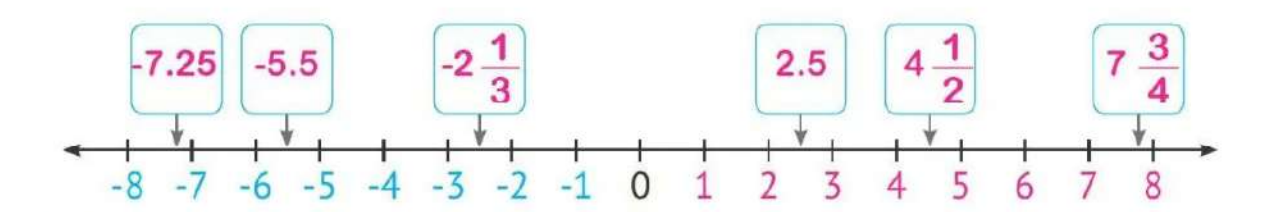
- -5.5 lies between the two integers -5 and -6.



- $6\frac{3}{4}$ lies between the two integers 6 and 7.

5 **Put the following numbers in the suitable places on the number line:**

$$4\frac{1}{2},\ 2.5,\ -2\frac{1}{3},\ -7.25,\ -5.5,\ 7\frac{3}{4}$$





We can determine, the additive inverse of a rational number, as:

- The additive inverse of 6.3 is -6.3 ($-\frac{63}{10}$).
- The additive inverse of $-\frac{5}{8}$ is $\frac{5}{8}$.

6 **Write the opposite number (the additive inverse) of each of the following rational numbers:**

a) $-0.8 \rightarrow$ 0.8

b) $-\frac{3}{4} \rightarrow$ $\frac{3}{4}$

c) $2.5 \rightarrow$ -2.5

d) $0 \rightarrow$ 0

e) $0.6 \rightarrow$ -0.6

f) $3\frac{1}{7} \rightarrow$ $-3\frac{1}{7}$

Comparing Two Rational Numbers

1. If the two numbers are different in sign, then the positive number is greater than the negative number.

$0.5 > -\frac{15}{8}$, $-1.5 < \frac{1}{8}$

2. If one of the two numbers is greater than a certain number, and the other number is less than the same number, then the first number is greater than the second number.

$-\frac{3}{5} < -\frac{2}{5}$ (Common Denominator)

$-\frac{1}{7} > -\frac{2}{7}$ (Common Denominator)

$\frac{3}{5} \square \frac{3}{7}$

$\frac{21}{35} > \frac{15}{35}$

$-\frac{5}{6} \square -\frac{3}{4}$

$-\frac{10}{12} < -\frac{9}{12}$

7 Compare using (<, =, or >):

a) $-\frac{6}{7}$ [<] $-\frac{3}{7}$

b) $-\frac{13}{10}$ [<] $\frac{1}{8}$

c) $\frac{5}{12}$ [<] $\frac{7}{12}$

d) $-\frac{4}{7}$ [<] $-\frac{1}{2}$

e) $\frac{3}{5}$ [<] $\frac{2}{3}$

f) $-\frac{2}{3}$ [<] $-\frac{2}{7}$

g) 0.9 [=] $\frac{9}{10}$

h) 1.4 [>] $\frac{14}{100}$

i) $-3\frac{1}{4}$ [<] 1

j) $-\frac{1}{3}$ [<] 0



- To arrange rational numbers, we follow the same **comparison rules**.

Ex. **Arrange the following numbers from the smallest to the greatest:**

a) $2.1\ ,\ 1.4,\ -3\frac{1}{4},\ -1\frac{7}{8},\ -2\frac{1}{2}$

The order: $-3\frac{1}{4}\ ,\ -2\frac{1}{2}\ ,\ -1\frac{7}{8}\ ,\ 1.4\ ,\ 2.1$

The numbers are arranged by looking at the integer parts in each number in first.

---

b) $-0.3\ ,\ 0.7\ ,\ -\frac{1}{2}\ ,\ \frac{3}{4}\ ,\ \frac{2}{5}$

$-0.3\ ,\ 0.7\ ,\ -\frac{1}{2}\ ,\ \frac{3}{4}\ ,\ \frac{2}{5}$

Put all the numbers in rational number form $\frac{a}{b}$. → $-\frac{3}{10}\ ,\ \frac{7}{10}\ ,\ -\frac{1}{2}\ ,\ \frac{3}{4}\ ,\ \frac{2}{5}$

Find the common denominators if you need to. → $-\frac{3}{10}\ ,\ \frac{14}{20}\ ,\ -\frac{5}{10}\ ,\ \frac{15}{20}\ ,\ \frac{8}{20}$

Arrange the negative numbers, and then the positive numbers. → $-\frac{5}{10}\ ,\ -\frac{3}{10}\ ,\ \frac{8}{20}\ ,\ \frac{14}{20}\ ,\ \frac{15}{20}$

The order: $-\frac{1}{2}\ ,\ -0.3\ ,\ \frac{2}{5}\ ,\ 0.7\ ,\ \frac{3}{4}$

8 **Arrange the following numbers:**

a) $3\frac{5}{9}\ ,\ 5\frac{3}{8}\ ,\ 0.6\ ,\ -4\ ,\ 2\frac{3}{7}$

1. Ascending order: -4 , 0.6 , $2\frac{3}{7}$, $3\frac{5}{9}$, $5\frac{3}{8}$
2. Descending order: $5\frac{3}{8}$, $3\frac{5}{9}$, $2\frac{3}{7}$, 0.6 , -4

b 0.3 , -0.2 , $\frac{1}{4}$, $-\frac{1}{4}$, $\frac{1}{2}$

1. Ascending order: $-\frac{1}{4}$, -0.2 , $\frac{1}{4}$, 0.3 , $\frac{1}{2}$
2. Descending order: $\frac{1}{2}$, 0.3 , $\frac{1}{4}$, -0.2 , $-\frac{1}{4}$



10

1 Choose the correct answer:

a "–1.9" is a/an ....

(counting number or natural number or integer or rational number)

b The opposite of $-\frac{8}{9}$ is .... ($\frac{8}{9}$ or $-\frac{9}{8}$ or $\frac{9}{8}$ or $1\frac{1}{8}$)

c $\frac{2}{3}$ ☐ $-\frac{2}{3}$ (> or = or <)

d The rational number –5 lies between the two integers ....

(–4, –5 or –3, –4 or –4, – 6 or 5, 6)

2 Complete the following:

a The additive inverse of 5.9 is -5.9 .

b -1 is a negative integer more than –2.

c All integers are rational numbers.

d The additive inverse of 0 is itself.

3 Arrange the following numbers in a descending order:

$-3\frac{1}{5}$, $-7\frac{1}{2}$, -3.8 , -7 , 7.7

7.7 , $-3\frac{1}{5}$, -3.8 , -7 , $-7\frac{1}{2}$

Unit 2

Rational Numbers



Concept 2.3 Interpret and Use Absolute Value

Lessons 5&6 Exploring Absolute Value
Comparing Absolute Values

Learning Objectives:

By the end of these lessons, the student will be able to:

- Represent distance for real-world situations involving jumping fish and meeting friends at a fishpond.
- Understand absolute value on a number line.
- Compare absolute values using symbols.
- Interpret the use of absolute value through real-world situations involving money and temperature

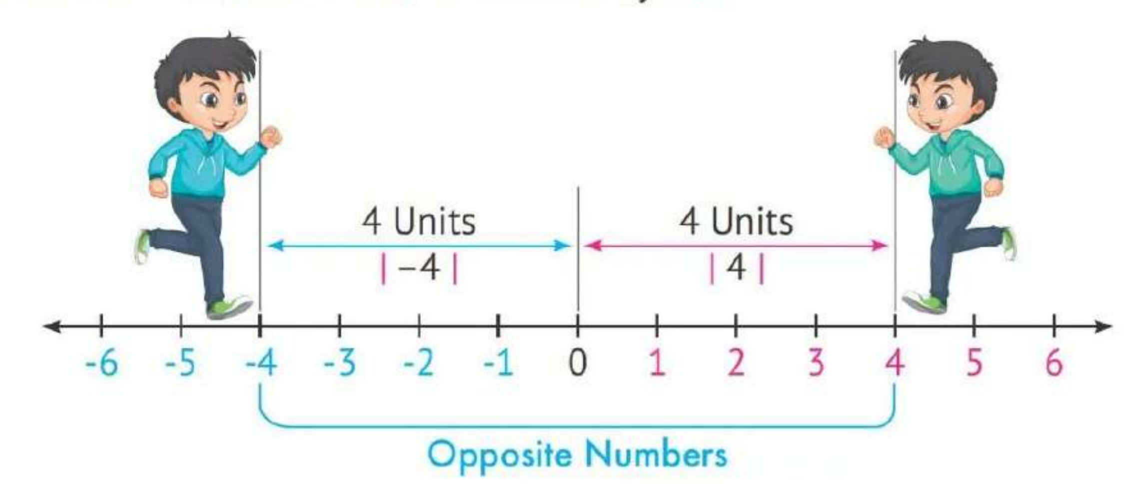




Exploring Absolute Value
Comparing Absolute Values

Absolute Value

- The absolute value is the **distance** between the position of a number and the position of zero on the number line.
- The absolute value of a number represents the **magnitude** of that number, regardless of the direction (positive or negative).
- The absolute value of "x" is denoted by $|x|$.



From the previous number line, we notice that:

- The distance between "4" and "0" is 4 units.

  So, the absolute value of 4 is 4. → $|4| = 4$

- The distance between "−4" and "0" is 4 units.

  So, the absolute value of −4 is 4.  $|-4| = 4$



- $|-4| = 4$
- $-|-4| = -4$

1 Find the value of each of the following:

a) $|-10| = 10$ b) $|4| = 4$

c) $|-\frac{2}{3}| = \frac{2}{3}$ d) $|\frac{4}{7}| = \frac{4}{7}$

e) $|2.05| = 2.05$ f) $|-12.5| = 12.5$

2 Find the value of "x" in each of the following:

a) If $|9| = x$, then $x = 9$.

b) If $|-15| = x$, then $x = 15$.

c) If $-|1.2| = x$, then $x = -1.2$.

d) If $|-2| + |-9| = x$, then $x = 2 + 9 = 11$.

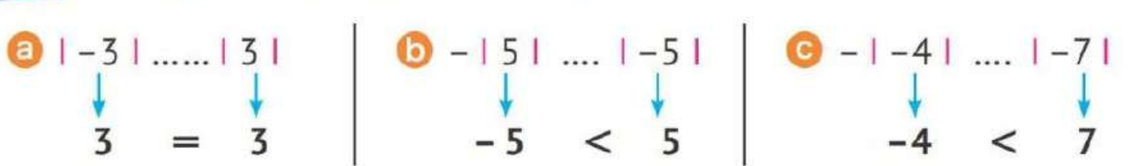
e) If $|x| = 6$, then $x = 6$ or $x = -6$.



- The absolute value of any number is a **positive number**, except zero.
- The absolute value of zero is **zero**. $|0| = 0$
- Opposite numbers on a number line have the **same** absolute values.
- The highest possible absolute value is the **farthest** from zero.
- The **smaller** possible absolute value is closer to **zero**.

Comparing Absolute Values

Ex. Compare using (<, =, or >):



a) $|-3| \ldots\ldots |3|$ → $3 = 3$

b) $-|5| \ldots |-5|$ → $-5 < 5$

c) $-|-4| \ldots |-7|$ → $-4 < 7$

Theme 1

3 Compare using (<, =, or >):

a) -1.4 [<] $|-1.4|$

b) $|-4|$ [>] $-|-4|$

c) $|-2.71|$ [>] 2.7

d) $|-8.2|$ [>] -7.9

e) $-|9\frac{3}{5}|$ [<] $|-9\frac{3}{4}|$

f) $5\frac{5}{6}$ [=] $|-\frac{35}{6}|$

4 Arrange the following numbers in an ascending order:

2.5 , -3.4 , $|-5.3|$, -4 , $|0.8|$

-4 , -3.4 , $|0.8|$, 2.5 , $|-5.3|$

5 Answer the following:

a) It is −5°C in freezer (A) and −22°C in freezer (B). Which freezer has the lower temperature?

Freezer (B) has the lower temperature

b) Lake (A) has a positional distance is −16 meters, and lake (B) has a positional distance is −6 m. Which lake is located farther below sea level?

Lake (A) is located farther below sea level

c) Which is the greater rational number? −4.88 or −4.8?

- 4.8 is the greater



$\frac{\quad}{10}$

1 Compare using (<, =, or >):

a) -0.5 [<] $|-0.7|$

b) $|-56|$ [>] 2.5

c) 0 [=] $|0|$

d) $\left|-\frac{2}{9}\right|$ [>] $-\frac{2}{7}$

2 Complete the following:

a) $|-48| \div |-6| =$ ...8...

b) If $|-5| = k$, then $k =$ ...5... .

c) $3 + |-7| =$ ...10...

d) If $-|-3| = x$, then $x =$ ...-3... .

3 Arrange the following numbers in an ascending order:

$$-\frac{1}{3} \ , \ \left|\frac{2}{3}\right| \ , \ \frac{9}{5} \ , \ \left|1\frac{1}{3}\right|$$

$-\frac{1}{3}$, $\left|\frac{2}{3}\right|$, $\left|1\frac{1}{3}\right|$, $\frac{9}{5}$

4 Arrange the following numbers in a descending order:

$$|-0.02| \ , \ 0.2 \ , \ -\left|2\frac{1}{2}\right| \ , \ \frac{1}{2}$$

$\frac{1}{2}$, 0.2 , $|-0.02|$, $-\left|2\frac{1}{2}\right|$

Unit 3 Algebraic Expressions



Concept 3.1 Use and Analyze Expressions

Lessons 1&2 Creating Mathematical Expressions Analyzing Mathematical Expressions

Learning Objectives:

By the end of these lessons, the student will be able to:

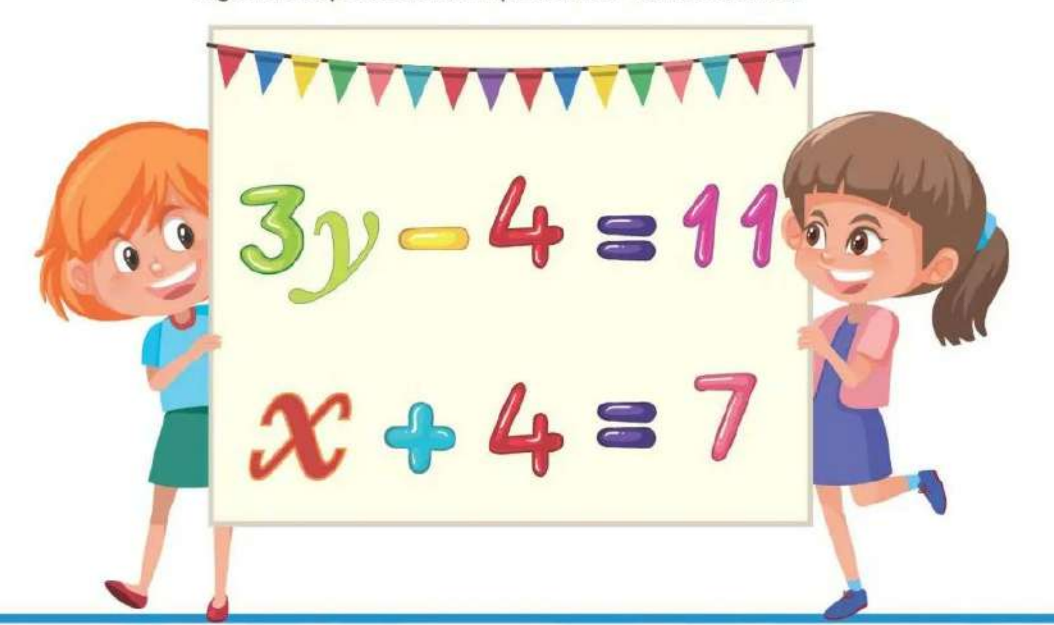
- Use a variable in a mathematical expression to communicate multiple pieces of data.
- Define the elements of algebraic expressions such as term, like terms, constants, and coefficients.

Lesson 3 Writing Algebraic Expressions

Learning Objectives:

By the end of this lesson, the student will be able to:

- Use a life-size number line to act out numeric and algebraic expressions.
- Write verbal expressions that represent numeric expressions and algebraic expressions that represent real-world scenarios.





Creating Mathematical Expressions
Analyzing Mathematical Expressions



• If the price of one pen is 3 pounds, then the price of:

2 pens: 3 X 2
3 pens: 3 X 3
4 pens: 3 X 4
5 pens: 3 X 5

Values don't change — **Constant**

Values change — **Variable**

- The price of the pen is constant.
- The number of purchased pens is variable.

Constant

- It is a number or a letter that represents a single number.



5 , − 1.2 , 127 , $\frac{5}{9}$

Variable

- It's a symbol, usually a letter, representing an unknown quantity that may vary or change.



x , y , z ,...

Algebraic Term

- The product of multiplying numbers and variables.

Constant → $4n$ ← Variable

Constant → $-\frac{5}{6}xy$ ← Variable

Algebraic term may be:

A variable only, → such as: x , y , z ,... its coefficient is "1".

A constant only, → such as: 5 , − 1.2 , 127 , $\frac{5}{9}$

Theme 1

1 **Complete the following table:**

	Algebraic Term	Coefficient	Variables
Ex.	$9xy$	9	x, y
a	$3m$	3	m
b	$-5y$	-5	y
c	ab	1	a , b
d	$-\frac{3}{7}n$	$-\frac{3}{7}$	n
e	$6xyz$	6	x , y , z

Mathematical Expressions

- Numerical Expression
- Algebraic Expression

Numerical Expression

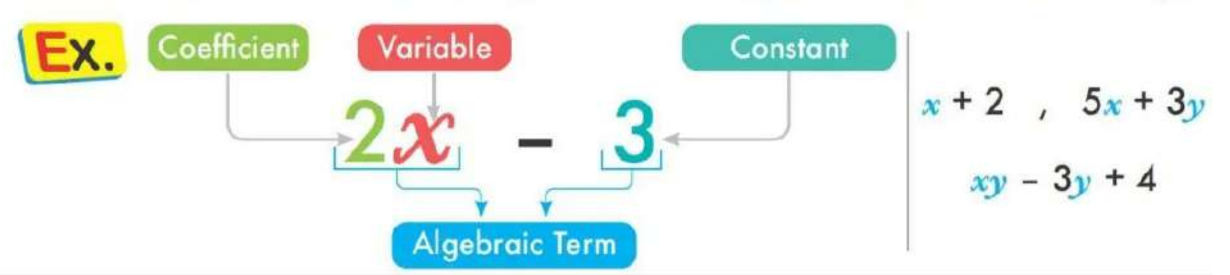
- It is a mathematical statement that contains a group of numbers and at least one operation.

Ex. $15 + 23 - 0.36$

Algebraic Expression

- It is a mathematical statement that may contain a group of numbers, variables, operation symbols ("+" , "–"), or any of them.
- Or, it consists of one or more algebraic terms separated by a "+" or "–" sign.

Ex.



2 Classify the following mathematical expressions into numerical expressions or algebraic expressions: Put a tick (✓):

	Mathematical Expression	Numerical Expression	Algebraic Expression
a	$3 + 0.2 - 1.25$	✓	✗
b	$5x - 3$	✗	✓
c	9 X 2.7	✓	✗
d	$2a + 3c - 5$	✗	✓
e	$9x$	✗	✓

3 Complete the following table:

	Mathematical Expression	Variables	Constants	Coefficients
Ex.	$3a + 6b + 7$	a, b	7	3, 6
Ex.	$-8xy + \frac{1}{3} + 20$	x, y	$\frac{1}{3}$, 20	− 8
a	$2a + 7 + 4c$	a , c	7	2 , 4
b	$17 + 5 + x$	x	17 , 5	1
c	$22 + \frac{1}{5} + 2y$	y	$22 , \frac{1}{5}$	2
d	$0.2q + 0.6r + 0.8s$	q , r , s	–	0.2 , 0.6 , 0.8
e	8	–	8	–

Like and Unlike Terms

- Algebraic terms are like if they have the same variable exactly.
- **Examples of like algebraic terms:** ($2a$, $-5a$, a) , ($5xy$, $-7xy$, xy)
- **Examples of unlike algebraic terms:** ($6y$, $-8ab$, $9x$)



Note: • All numerical terms (constants) are like terms.

Ex. **Complete the following table:**

	Expression	Number of Terms	Like Terms
a	5	1	None
b	8 + 2	2	2, 8
c	$5b + 6 + 2b$	3	$5b$, $2b$
d	$3x + 7$	2	None

4 **Complete the following table:**

	Expression	Number of Terms	Like Terms
a	$x + \frac{3}{8}x + 3$	3	x , $\frac{3}{8}x$
b	$m + 3 + 2m + 2$	4	m , 2m and 3 , 2
c	$16x + 2x$	2	$16x$, $2x$
d	$7x + 7x + 1 + 2x$	4	$7x$, $7x$, $2x$

Writing a mathematical expression:

Ex. If an astronaut is approximately 0.05 meters taller while traveling in space than he is on Earth, write a mathematical expression that represents the astronaut's height on Earth if his height in space is h meters.

Answer: Mathematical expression: $h - 0.05$

5 **Write a mathematical expression that represents each of the following situations:**

ⓐ The weight of the astronaut on the moon is $\frac{1}{6}$ his weight of the Earth. If the weight of an astronaut on Earth is m kg, then his weight on the moon is: $\frac{1}{6}$ m Kg .

ⓑ If Ahmed sleeps for 7 hours a day, then the number of hours he sleeps in n days is: 7 n hours .



10

1 **Choose the correct answer:**

ⓐ In the algebraic term " $-5xy$ ", the coefficient is ....
(y or x or 5 or [-5])

ⓑ Like terms for the algebraic expression "$3 + 5a + 2a$" are ....
(3, $5a$ or [$5a$, $2a$] or 3, $2a$ or 3, $5a$, $2a$)

ⓒ The number of terms of the algebraic expression $2.5x + 2xy - 4$ is ....
([3] or 4 or 5 or 6)

2 **Complete the following:**

ⓐ The type of the mathematical expressions are numerical expression or Algebraic .

ⓑ 7 X (2.7 + 1.3) is a/an numerical expression.

ⓒ The variable(s) in the algebraic term: $5ab$ is a , b .

3 **Match:**

ⓐ In ($3x + 7$), then 7 is a (3) constant .	coefficient **1**
ⓑ In ($3x + 7$), then 3 is a (1) coefficient .	variable **2**
ⓒ In ($3x + 7$), then x is a (2) variable .	constant **3**



Lesson 3 Writing Algebraic Expressions

Converting Algebraic Expressions into Verbal Expressions

- The algebraic expression can be written in words. This is called a verbal expression.

- There are words or phrases that can be used to suggest the operation in a mathematical problem, such as:

Addition



- Added to
- More
- And
- Sum
- Plus
- Together
- The total
- Exceeded
- Increase

For example:

- x plus 8 is $x + 8$.
- The sum of x and 2 is $x + 2$.

Subtraction



- Subtracted
- Less
- Minus
- How much is
- The increase
- The decrease
- The difference
- Take away

For example:

- x minus 3 is $x - 3$.
- 7 minus x is $7 - x$.

Multiplication



- Times
- Times of
- Multiplied by
- Each
- Double
- Twice
- Product
- Multiplication
- Triple
- Thrice

For example:

- Twice x is $2x$.
- 5 multiplied by x is $5x$.
- 3 times x is $3x$.
- 4 times x is $4x$.

Division



- Divided by
- Ratio
- For each
- Half/quarter...
- Quotient
- Division
- Distribution

For example:

- Half of x is $\frac{1}{2}x = \frac{x}{2}$.
- Third of x is $\frac{1}{3}x = \frac{x}{3}$.

1 **Express each of the following using algebraic expressions:**

a) 5 more than x: ($x + 5$)   b) 3 less than y: (y – 3)

c) 4 multiplied by a: (4a)   d) Twice n: (2n)

e) Half of m: ($\frac{1}{2}$ m)   f) 5 divided by t: (5 ÷ t)

Ex.

The following algebraic expression can be expressed using the verbal form in more than one way:

$x + 2$:

- The sum/ total of x and 2
- x plus 2
- x increased by 2
- 2 more than x
- 2 greater than x
- 2 added to x

2 **Write each of the following algebraic expressions using the word form. Name two different verbal expressions for each of them:**

a) $x + 7$
1. x plus 7
2. The sum of x and 7

b) $x - 3$
1. x minus 3
2. x decreased by 3

c) $8x$
1. The product of x and 8
2. 8 times x

d) $\frac{x}{3}$
1. x divided by 3
2. Third x



Theme 1

Important Notes:

- An algebraic expression can have **more than one** operation.
- Parentheses are used to express the **result** of addition or subtraction.

Ex. **The following algebraic expressions have two operations:**

$2x + 5$ Sum of the double of x and 5	$2(x + 5)$ Double of the sum of x and 5
$7x - 3$ The difference between 7 times x and 3	$7(x - 3)$ 7 times the difference between x and 3

Notice the change in the verbal expression when using parentheses.

3 **Express each of the following verbal forms using algebraic expressions:**

a) 6 is more than three times m: ($3m + 6$)

b) 4 is less than 3 multiplied by a: ($3a - 4$)

c) The sum of half of y and 7: ($\frac{1}{2}y + 7$)

d) Twice the sum of b and 6: ($2(b + 6)$)

e) The sum of twice b and 6: ($2b + 6$)

4 **Write each of these algebraic expressions using the verbal form:**

a) $3x + 2$: The sum of triple x and 2

b) $4y - 6$: 4 times y minus 6

c) $\frac{1}{3}x - 4$: Third x minus 4

d) $6(a + 7)$: 6 times the sum of a and 7

e) $3(s - 2)$: 3 times the difference between s and 2

5 **Choose the algebraic expression that represents each of the following:**

a) Twelve is less than three times y.

($12 - 3y$ or **[$3y - 12$]** or $3(y - 12)$ or $3(12 - y)$)

b) Mohamed bought 4 boxes, each containing "c" of cookies.

($c + 4$ or $c - 4$ or **[$4c$]** or $4 \div c$)

c) Aunt Farah has collected the **same** number of eggs for two weeks, and in the **third** week, she cooked half of the eggs she collected previously. How many eggs does she have left?

[$2 \div 14e$ or $(2 \div 14)e$ or $14e \div 2$ or $2e \div 14e$]

d) Hazem's car needs **one** liter of gasoline to travel a distance of **15** km. How many liters does the car need for d km?

($15d$ or $15 + d$ or $\frac{15}{d}$ or $\frac{d}{15}$)



$\frac{\quad}{10}$

1 Write each of these algebraic expressions using the verbal form:

a) $x - 2$: x decreased by 2

b) $5a + 7$: The sum of 7 and 5 times a

c) $36 - 2y$: Double of y subtracted from 36

2 Choose the correct answer:

a) Kareem is "y" years old now, how old was he 3 years ago? ....

($y - 3$ or $y + 3$ or $3 \div y$ or $3y$)

b) Twice the sum of 7 and x is ....

($2x + 7$ or $2(x + 7)$ or $27 + x$ or $2(2x + 7)$)

c) The operation in the algebraic expression of: double the number minus 4 is: ....

(+, − or x, − or x, + or x, ÷)

3 Match each verbal expression to the appropriate algebraic expression:

a) The sum of y and 3 is (4) y + 3		$2y + 3$ **1**
b) The sum of twice of y and 3 is (1)	2y + 3	$3y$ **2**
c) The product of y and 3 is (2) 3y		$2(y + 3)$ **3**
d) Twice the sum of y and 3 is (3)	2(y + 3)	$y + 3$ **4**



Unit 3 Algebraic Expressions



Concept 3.2 Algebraic Expressions and Exponents

Lesson 4
Ordering of Operations and Exponents

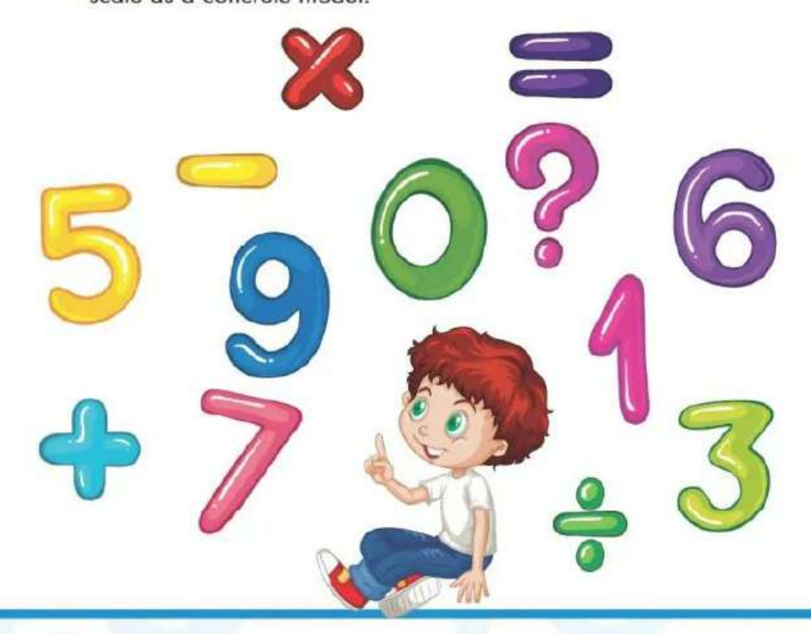
Learning Objectives:

By the end of this lesson, the student will be able to:
- Review the basic order of operations.
- Simplify numeric expressions that contain exponents.

Lessons 5–7
Evaluating Algebraic Expressions
Applications on Algebraic Expressions
Determining Equivalent Algebraic Expressions

Learning Objectives:

By the end of these lessons, the student will be able to:
- Use substitution to evaluate algebraic expressions related to real-world situations.
- Evaluate expressions involving exponents and parentheses
- Explore whether two expressions are equivalent using a balance scale as a concrete model.





Lesson 4 Ordering of Operations and Exponents

Remember

Steps of the Order of Operations

1. Perform operations within parentheses ( ).
   1. Multiply or divide from left to right.
   2. Add or subtract from left to right.
2. Perform operations within brackets [ ].
   1. Multiply or divide from left to right.
   2. Add or subtract from left to right.
3. Perform operations outside of parentheses or brackets.
   1. Multiply or divide from left to right.
   2. Add or subtract from left to right.

Ex. Use the order of operations to evaluate the expression:

8 X [24 ÷ (4 + 2) - 1] + 5

- Operations within parentheses — Adding → = 8 X [24 ÷ 6 - 1] + 5
- Operations within brackets — 1 Dividing → = 8 X [4 - 1] + 5
- Operations within brackets — 2 Subtracting → = 8 X 3 + 5
- Operations outside brackets — 1 Multiplication → = 24 + 5
- Operations outside brackets — 2 Adding → = 29

1 Use the order of operations to evaluate the expressions:

a) 4 X 6 + 18 ÷ 3
= 24 + 18 ÷ 3
= 24 + 6 = 30

b) (5 + 8) X (16 – 9)
= 13 X 7
= 91

c) [1.5 X (12 + 8)] – 15
= [1.5 X 20] - 15
= 30 - 15 = 15

d) 28 ÷ [4 X (4 – 0.5)]
= 28 ÷ [4 X 3.5]
= 28 ÷ 14 = 2

Repeated Multiplication

- Repeated multiplication is the repeated multiplication of a number by itself a number of times.

Ex. $2 \times 2 \times 2 \times 2$ **(It is a repeated multiplication of 2 by itself 4 times.)**

Repeated multiplication $2 \times 2 \times 2 \times 2$ can be written as 2^4.

And it's read as: 2 to the power of 4  The fourth power of 2

- **We note that:**
  - 2 is the repeated number and is called the "base".
  - 4 is the number of repetitions, and is called the "exponent, power, or index".

Exponent

2^4

Base

Ex. $4 \times 4 \times 4 = 4^3$, **and it's read as: 4 to the power of 3.**

Important Notes:

- Any number to the power of 1 = **itself**.

For example: • $3^1 = 3$ "3 to the power of 1 **or** the first power of 3"

The power of 1 is not written.

- $3 \times 3 = 3^2$ "3 to the power of 2, **or** the second power of 3 **or** the square of 3."

- $4 \times 4 \times 4 = 4^3$ "4 to the power of 3, **or** the third power of 4 **or** the cube of 4."

- $2^5 \neq 2 \times 5$

"**Because:** $2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$ **While** $2 \times 5 = 10$"

- Any number to the zero power equals 1. **(Except zero)**

For example: $3^0 = 1$, $6^0 = 1$, $(-4)^0 = 1$

- 1 to the power of any number = 1.

For example: $1^9 = 1$, $1^5 = 1$, $1^7 = 1$

- 0 to the power of any number = 0. **(Except zero)**

For example: $0^6 = 0$, $0^2 = 0$, $0^{23} = 0$

2 Complete the following:

ⓐ $9 \times 9 \times 9 = 9^{3}$

ⓑ $7 \times 7 \times 7 \times 7 \times 7 \times 7 = 7^{6}$

ⓒ $7 \times 7 \times 7 \times 7 = 7^4$

ⓓ $3^2 = 3 \times 3 = 9$

ⓔ $2^3 = 2 \times 2 \times 2 = 8$

ⓕ $5^0 = 1$

ⓖ $0^3 = 0$

ⓗ $1^7 = 1$

ⓘ $8^{0} = 1$

ⓙ $1^{5} = 1$

ⓚ $0^{4} = 0$

Order of Operations and Exponents

- When the expression contains exponents, the value of the exponents is calculated before multiplication and division.

1 Perform operations within parentheses ( ). → 2 Perform operations within brackets [ ]. → 3 Perform operations outside of parentheses or brackets.

Each step:
1. Exponents
2. Multiply or divide from left to right.
3. Add or subtract from left to right.

Ex. **Use the order of operations to evaluate the expression:**

ⓐ $(15 - 9) + 3 \times 4^2 \div 2$

$= 6 + 3 \times 4^2 \div 2$

$= 6 + 3 \times 16 \div 2$

$= 6 + 48 \div 2$

$= 6 + 24$

$= 30$

ⓑ $6^2 \div (17 - 8) \times (3 + 4)$

$= 6^2 \div 9 \times 7$

$= 36 \div 9 \times 7$

$= 4 \times 7$

$= 28$

3 Use the order of operations to evaluate the expressions:

a) $2 \times 5 + 3^2$
$= 2 \times 5 + 9$
$= 10 + 9$
$= 19$

b) $64 \div 2^4 \times 5$
$= 64 \div 16 \times 5$
$= 4 \times 5$
$= 20$

c) $20 \times (5 + 4) - 5^2 \times 4$
$= 20 \times 9 - 25 \times 4$
$= 180 - 100$
$= 80$

d) $10^2 \times [3 \times (2.35 - 1.12)]$
$= 100 \times [3 \times 1.23]$
$= 100 \times 3.69$
$= 369$



$\frac{\quad}{10}$

1 Find the value of:

a) $3^3 = 3 \times 3 \times 3 = 27$

b) $48 \div 8 \times 2 = 6 \times 2 = 12$

c) $8 \times (12 \div 4) = 8 \times 3 = 24$

d) $8 + 5^2 - 3^{zero} = 8 + 25 - 1 = 33 - 1 = 32$

e) $(2^5 + 3) \div (2^3 - 1) = (32 + 3) \div (8 - 1) = 35 \div 7 = 5$

2 Choose the correct answer:

a) $4^3 =$ .... ($4 + 3$ or 4×3 or $4 + 4 + 4$ or **$4 \times 4 \times 4$**)

b) $(10 \times 3 - 8) - 5 \times (6 - 2)$ (8 or 0 or **2** or 68)

c) 3^2 ☐ 2^3 ($<$ or $=$ or **$>$** or $\leq$)

d) $2^3 + 2^3 =$ .... (4^3 or 3^4 or **2^4** or 4^6)

e) $7^{\dots} = 7$ (0 or **1** or 2 or 10)



Evaluating Algebraic Expressions
Applications on Algebraic Expressions
Determining Equivalent Algebraic Expressions



Write an Algebraic Expression

Ex. **If the price of a small bottle of water is 3 pounds. Find the price of "x" bottles.**

Answer:
- The price of a bottle is constant, while the number of bottles changes.
- The price of "x" bottles is $3x$.

Ex. **If the price of one shirt is 100 pounds and you have a coupon for 40 LE off your entire purchase. Find the price of "y" shirts.**

Answer:
- The price of a shirt is constant, while the number of shirts changes.
- The price of "y" shirts (before using coupon) is $100y$.
- The price of "y" shirts (after using coupon) is $100y - 40$.

1 **Write the algebraic expression that represents each of the following situations:**

ⓐ If the price of one book is 25 pounds, what is the price of "a" books?

The price of "a" books = 25a pounds

ⓑ If a meal costs 65 pounds, what is the price of "b" meals of the same type?

The price of "b" meals = 65b pounds

ⓒ Medhat bought "x" kilograms of chocolate and put them in a box that costs 5 pounds. If the price of one kilogram is 34 pounds, what is the amount paid by Medhat?

Medhat paid = $34x + 5$ pound

ⓓ Mona saved 22 pounds, from which she bought 3 notebooks, the price of each y pounds. How much money is left with Mona?

The left money = $22 - 3y$ pounds

Evaluating the Algebraic Expression

- You can find the value of an algebraic expression by replacing the variable used with a numerical value, and then follow the order of operations to find the numerical value of that expression.

Ex. **Use the order of operations to evaluate the expression:**

ⓐ $6 \div (8x - 3)$ [for $x = 0.5$]

$= 6 \div (8 \times 0.5 - 3)$

$= 6 \div (4 - 3)$

$= 6 \div 1$

$= 6$

ⓑ $9 + (p^2 - 3) \div 2$ [for $p = 5$]

$= 9 + (5^2 - 3) \div 2$

$= 9 + (25 - 3) \div 2$

$= 9 + 22 \div 2$

$= 9 + 11 = 20$

2 **Use the order of operations to evaluate the expressions:**

ⓐ $5m + 2$ [For $m = 0.4$]

$= 5 \times 0.4 + 2$

$= 2 + 2$

$= 4$

ⓑ $9y - 2^3$ [For $y = 2$]

$= 9 \times 2 - 2^3$

$= 18 - 8$

$= 10$

ⓒ $28 \div (n + 2) + 7$ [For $n = 5$]

$= 28 \div (5 + 2) + 7$

$= 28 \div 7 + 7$

$= 4 + 7 = 11$

ⓓ $12 \div (a^2 - 10)$ [For $a = 4$]

$= 12 \div (4^2 - 10)$

$= 12 \div (16 - 10)$

$= 12 \div 6 = 2$

ⓔ $b^3 \times 3 \div 6$ [For $b = 2$]

$= 2^3 \times 3 \div 6$

$= 8 \times 3 \div 6$

$= 24 \div 6 = 4$

ⓕ $6^2 \div 3 \times (a - 2)$ [For $a = 4$]

$= 36 \div 3 \times (4 - 2)$

$= 36 \div 3 \times 2$

$= 12 \times 2 = 24$

3 **A worker in a factory receives a daily wage of 100 pounds for working for a specified number of hours, in addition to an amount of 30 pounds for every additional hour of work.**

ⓐ Write an algebraic expression that expresses the wage that the worker receives on a day on which he worked for y of overtime hours.

The wage = $100 + 30y$ pounds

ⓑ If the number of overtime hours is 3 hours, what is the amount that he gets for that day?

The amount = $100 + 30 \times 3 = 100 + 90 = 190$ pounds

Equivalent Algebraic Expressions

- Algebraic expressions are equivalent if they represent the same value for every value of the variable(s).

Ex. Evaluate each of the following expressions using two different positive integers of your choice. If the expressions are equal, answer yes. If they are not equal, answer no.

a	$x + 2x$	$2(x + 2)$	Equal or Not?
If $x = 1$	$1 + 2 \times 1$ $= 1 + 2 = 3$	$2 \times (1 + 2)$ $= 2 \times 3 = 6$	No
If $x = 2$	$2 + 2 \times 2$ $= 2 + 4 = 6$	$2 \times (2 + 2)$ $= 2 \times 4 = 8$	No

From the previous table, we find that:

- The two algebraic expressions "$x + 2x$" and "$2(x + 2)$" are not always equal. **So,** they are not equivalent.

---

b	$6x + 3$	$3(2x + 1)$	Equal or Not?
If $x = 3$	$6 \times 3 + 3$ $= 18 + 3$ $= 21$	$3 \times (2 \times 3 + 1)$ $= 3 \times (6 + 1)$ $= 3 \times 7 = 21$	Yes
If $x = 4$	$6 \times 4 + 3$ $= 24 + 3$ $= 27$	$3 \times (2 \times 4 + 1)$ $= 3 \times (8 + 1)$ $= 3 \times 9 = 27$	Yes

From the previous table, we find that:

- The two algebraic expressions "$6x + 3$" and "$3(2x + 1)$" are always equal. **So,** they are equivalent.

c	$3x - 2$	$3 - (x + 1)$	Equal or Not?
If $x = 1$	$3 \times 1 - 2$ $= 3 - 2 = 1$	$3 - (1 + 1)$ $= 3 - 2 = 1$	Yes
If $x = 2$	$3 \times 2 - 2$ $= 6 - 2 = 4$	$3 - (2 + 1)$ $= 3 - 3 = 0$	No

From the previous table, we find that:

- The two algebraic expressions "$3x - 2$" and "$3 - (x + 1)$" are not always equal, **So,** they are not equivalent.

4 **Evaluate each of the following expressions using two different positive integers of your choice. If the expressions are equal, answer yes. If they are not equal, answer no.**

a	$3x + 6$	$x + 3 + 2(x + 1)$	Equal or Not?
If $x =$ 1	$3 \times 1 + 6$ $= 6 + 3$ $= 9$	$1 + 3 + 2(1 + 1)$ $= 1 + 3 + 2 \times 2$ $= 1 + 3 + 4$ $= 8$	No
If $x =$ 2	$3 \times 2 + 6$ $= 6 + 6$ $= 12$	$2 + 3 + 2 \times (2 + 1)$ $= 2 + 3 + 2 \times 3$ $= 2 + 3 + 6$ $= 11$	No

From the previous table, we find that:

- The two algebraic expressions are not equivalent

(equivalent or not equivalent)

b	$4x + 6$	$3(x + 2)$	Equal or Not?
If x = 1	$4 \times 1 + 6$ $= 4 + 6$ $= 10$	$3(1 + 2)$ $= 3 \times 3$ $= 9$	No
If x = 2	$4 \times 2 + 6$ $= 8 + 6$ $= 14$	$3 \times (2 + 2)$ $= 3 \times 4$ $= 12$	No

From the previous table, we find that:

- The two algebraic expressions are **equivalent**.

(equivalent or not equivalent)

c	$2x + 2$	$2(x + 1)$	Equal or Not?
If x = 1	$2 \times 1 + 2$ $= 2 + 2$ $= 4$	$2 \times (1 + 1)$ $= 2 + 2$ $= 4$	Yes
If x = 2	$2 \times 2 + 2$ $= 4 + 2$ $= 6$	$2 \times (2 + 1)$ $= 2 \times 3$ $= 6$	Yes

From the previous table, we find that:

- The two algebraic expressions are **equivalent**.

(equivalent or not equivalent)



—
10

1 Complete the following:

a. If the price of one pen is 9 pounds, what is the price of k pens?

The price of K pens = 9 K

b. Lojy saves z pounds per day. Then, she saves ......7z...... pounds in a week.

c. The value of the expression $2x$ (for x = 7) is ...2 X 7 = 14... .

d. Are the two expressions $2(x + 3)$ and $4x + 6$ equivalent?

......No...... (Yes or No)

2 Match:

a. The value of $b^3 - 4b \div 2$ [for $b = 2$] is	② 4	7 ①
b. The value of $x^2 + x^3 - 10$ [for $x = 2$] is	③ 2	4 ②
c. The value of $(y^2 - 1) \div 5$ [for $y = 6$] is	① 7	2 ③

3 Choose the correct answer:

a. $3a + 7 = 25$ when a = ... (5 or [6] or 7 or 8)

b. $c^3 + 1 = 9$ when c = ... (1 or 5 or 8 or [2])

c. $4y - 10 = 14$ when y = ... ([6] or 5 or 8 or 2)

Unit 4

Equations and Inequalities



Lesson 1 Solving Algebraic Equations

Learning Objective:

By the end of this lesson, the student will be able to:

- Use a pan balance to model and solve algebraic equations.

Lessons 2&3 Exploring Inequalities / Solving Inequalities

Learning Objectives:

By the end of these lessons, the student will be able to:

- Explore signs that indicate a restriction such as a speed limit, a sale markdown, a weight limit, or a capacity limit.
- Analyze these scenarios and determine how they differ from equation scenarios.
- Use a number line to represent inequalities.



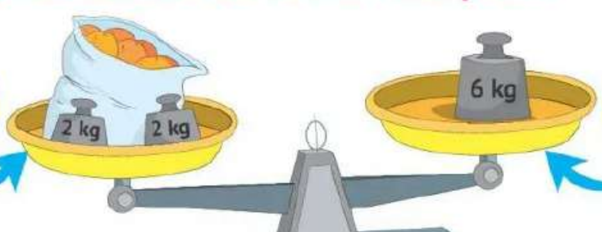


Solving Algebraic Equations

The Concept of Equation

The following figure shows a scale with two pans.





A pan holds 6 kg.

- If we denote the mass of the bag of oranges as "x" kilograms.

So, the total mass on the left side is (x + 4) kilograms.

- The mass of the two pans is equal when

  $x + 4 = 6$ **or** when $x = 2$.

- This means that the mass of the two pans is equal when the mass of the orange bag is 2 kg.

Important Notes:

- $x + 4 = 6$, x is called an equation.
- The letter "x" is called "unknown" or "variable".
- The number "2" is called the solution to the equation (The value of x).

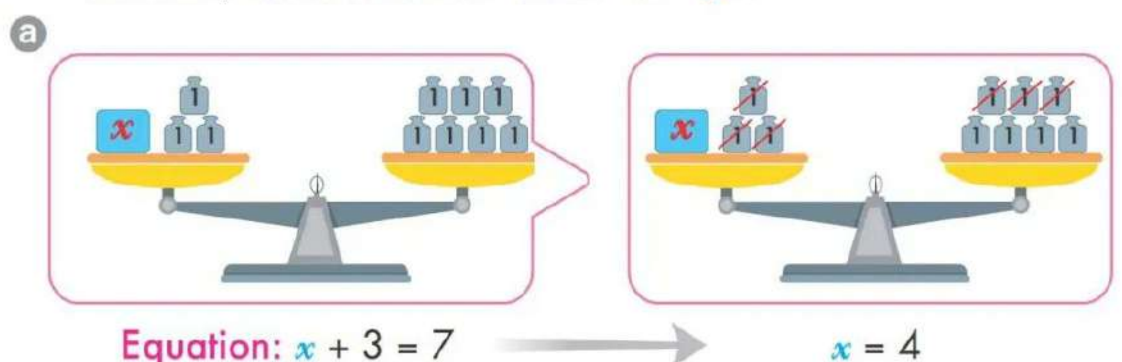
- **The equation:** Is a mathematical sentence that includes an equal relationship between two mathematical expressions.
- The equation has two sides with an (=) sign between them.
- Solving equation: means finding the value of the (unknown) variable.

Examples on the equations:

$x + 3 = 8$, $x - 6 = 2$, $3x = 12$, $\frac{x}{3} = 5$

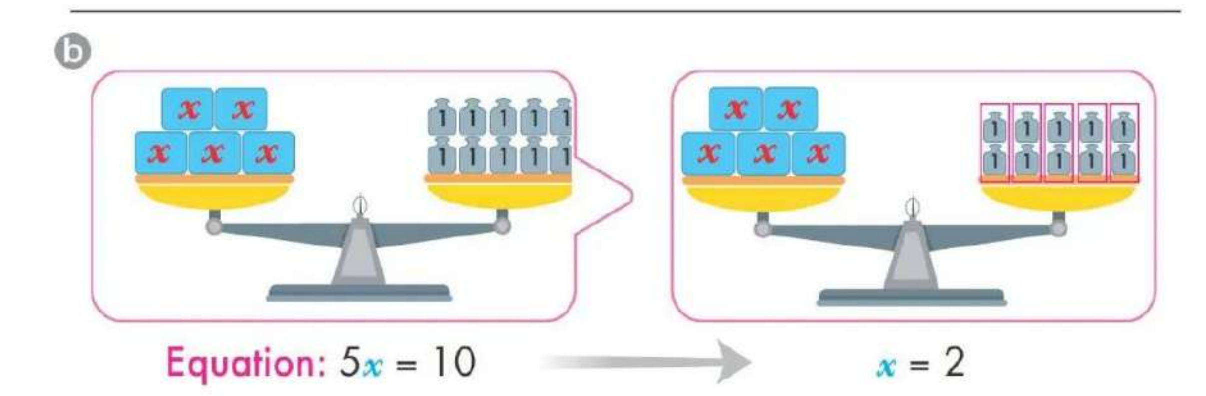
Ex. Write the equation that represents each of the following models, then find the value of "x":

ⓐ



Equation: $x + 3 = 7$ → $x = 4$

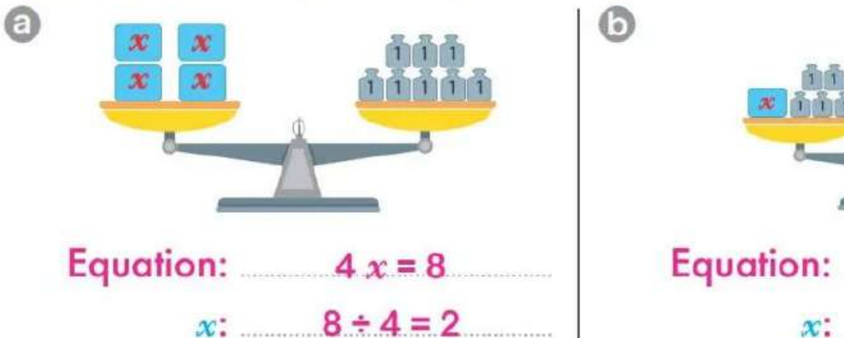
ⓑ



Equation: $5x = 10$ → $x = 2$

1 Write the equation that represents each of the following models, then find the value of "x":

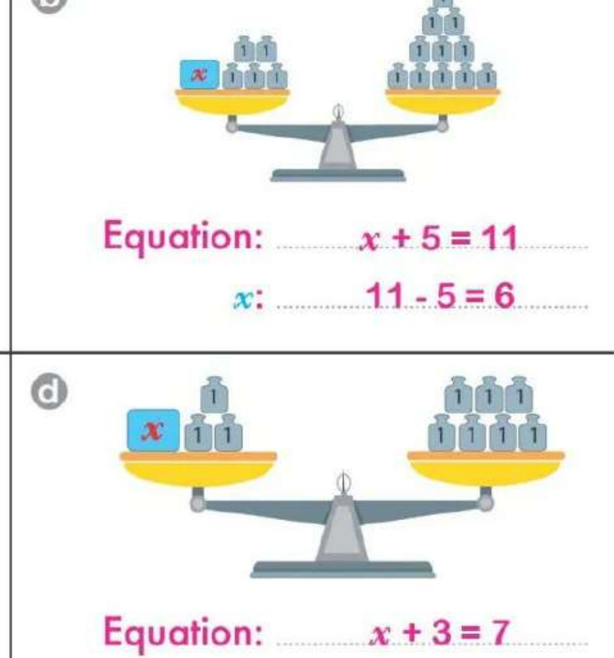
ⓐ



Equation: $4x = 8$

x: $8 \div 4 = 2$

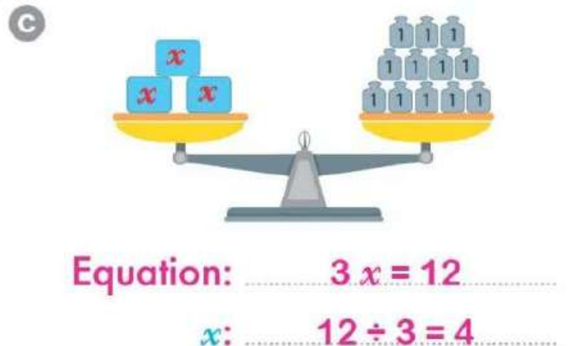
ⓑ



Equation: $x + 5 = 11$

x: $11 - 5 = 6$

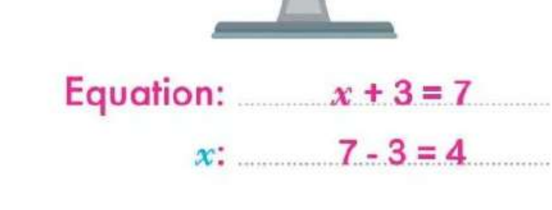
ⓒ



Equation: $3x = 12$

x: $12 \div 3 = 4$

ⓓ



Equation: $x + 3 = 7$

x: $7 - 3 = 4$

Solve Equations

- **Adding** equal amounts to both sides of the equation doesn't affect equality.

Ex. $b - 3 = 4$

By adding 3 to both sides of the equation

$b - \cancel{3} + \cancel{3} = 4 + 3$

$b = 7$

- **Subtracting** equal amounts from both sides of the equation doesn't affect equality.

Ex. $a + 5 = 9$

By subtracting 5 from both sides of the equation

$a + \cancel{5} - \cancel{5} = 9 - 5$

$a = 4$

- **Dividing** both sides of the equation by the same number (not equal to zero) doesn't affect equality.

Ex. $5\,m = 15$

By dividing both sides of the equation by 5,

$\frac{\cancel{5}\,m}{\cancel{5}} = \frac{15}{5}$

$m = 3$

- **Multiplying** both sides of the equation by the same number (not equal to zero) doesn't affect equality.

Ex. $\frac{1}{3}\,n = 2$

By multiply both sides of the equation by 3,

$\frac{1}{\cancel{3}}\,n \times \cancel{3} = 2 \times 3$

$n = 6$

2 **Find the value of the variable in each of the following equations (solve the equation):**

(a) $x + 7 = 15$

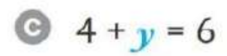
$x = 15 - 7$

$x = 8$

(b) $a - 6 = 5$

$a = 5 + 6$

$a = 11$



c) $4 + y = 6$

$y = 6 - 4$

$y = 2$

d) $6m = 18$

$m = 18 \div 6$

$m = 3$

e) $\frac{n}{5} = 3$

$n = 5 \times 3$

$n = 15$

f) $\frac{1}{4} t = 2$

$t = 2 \times 4$

$t = 8$



10

1 Find the value of the variable in each of the following equations (solve the equation)

a) $x + 2 = 11$

$x = 11 - 2$

$x = 9$

b) $m - 7 = 9$

$m = 9 + 7$

$m = 16$

c) $5y = 45$

$y = 45 \div 5$

$y = 9$

d) $\frac{k}{8} = 6$

$K = 8 \times 6$

$K = 48$

2 Choose the correct answer:

a) If $m + 7 = 25$, then $m =$ .... (7 or 10 or [18] or 20)

b) If $k = 10$, then $k -$ .... $= 4$. (10 or 4 or 2 or [6])

c) If $3f = 27$, then $f =$ .... (8 or [9] or 7 or 4)



Lessons 2&3 Exploring Inequalities Solving Inequalities

Ex. If Farida has 100 pounds, what can she choose from the following?



So, the price of items should be less than or equal to 100 pounds.

1 The sign shows the speed limit for a road in kilometers per hour. Record all speeds that are acceptable to drive on the road.



a 48 km/hr
b 40 km/hr
c 50 km/hr
d 43 km/hr
e 30 km/hr
f 49 km/hr

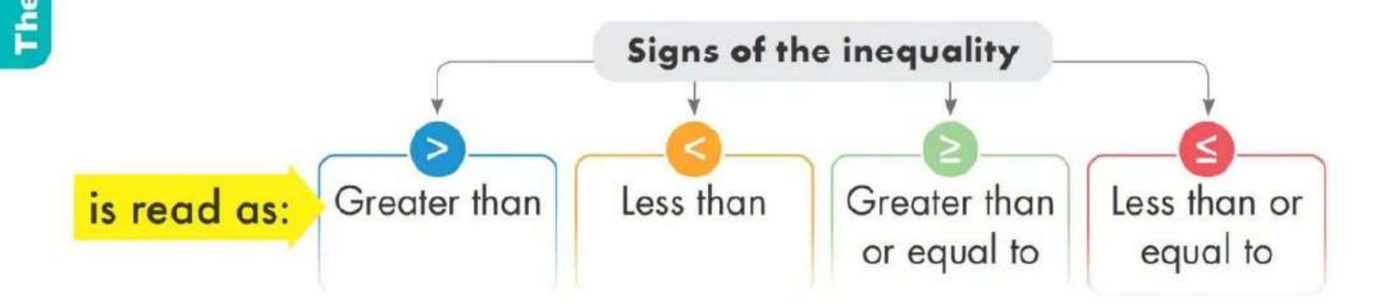
2 The sign shows the sale prices of some clothes on a sale rack. Use the sign to determine any prices you might expect to pay for an item from this rack. Record all prices that apply.



a 140.99 LE
b 290.99 LE
c 180.99 LE
d 120.99 LE
e 150.49 LE
f 150.99 LE

Inequality

- Is a mathematical relationship that compares the value of two mathematical expressions by using the signs of the inequality.



Solving Inequalities by Using a Number Line

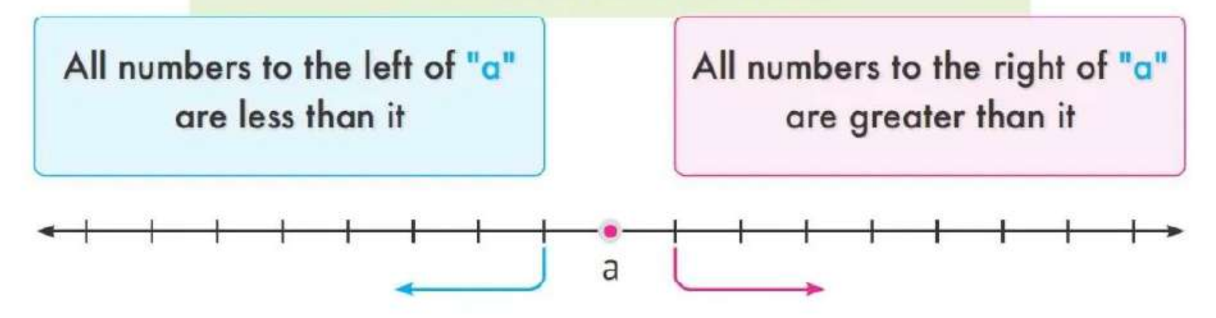
The Solution of the Inequality

- Is to find the values of the variable (unknown) that make the inequality relation true.

Representing Inequalities on a Number Line

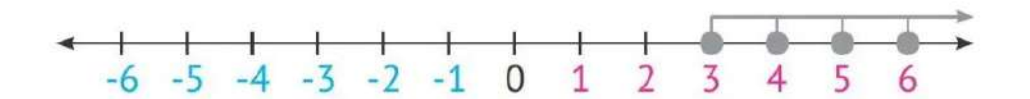
- All integers are represented only by dots at these numbers, which connect them with a line that extends without limit.

If "a" is an integer and it is represented on the number line then:



For example:

a) $x > 2$ is read as x is greater than 2.

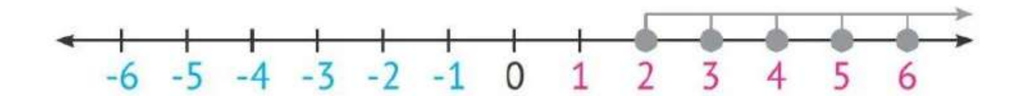


- The set of values that satisfy the inequality is 3 , 4 , 5 , 6 , 7 , 8...

(All integers are greater than 2)

---

b) $x \geq 2$ is read as x is greater than or equal to 2.

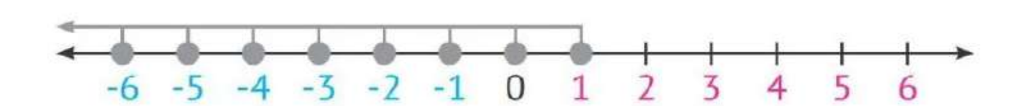


- The set of values that satisfy the inequality is 2 , 3 , 4 , 5 , 6 , 7 , 8...

(All integers are greater than or equal to 2)

---

c) $x < 2$ is read as x is less than 2.

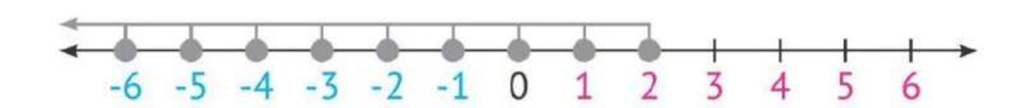


- The set of values that satisfy the inequality is 1 , 0 , -1 , -2 , -3 , -4 , -5...

(All integers are less than 2)

---

d) $x \leq 2$ is read as x is less than or equal to 2.



- The set of values that satisfy the inequality is 2 , 1 , 0 , -1 , -2 , -3 , -4 , -5...

(All integers are less than or equal to 2)

3 **Write the inequality that represents each of the following expressions:**

a) All values greater than 4: $x > 4$.

b) All values less than −3: $x < -3$.

c) All values greater than or equal to −1: $x \geq -1$.

d) All values less than or equal to 5: $x \leq 5$.

e) All values to the right of 7 on the number line are:

$x > 7$.

f) All values to the left of −1 on the number line plus −1: $x \leq -1$.

4 **Write what each of the following inequalities represents:**

a) $x > -5$: All values greater than - 5 .

b) $x < 1$: All values Less than 1 .

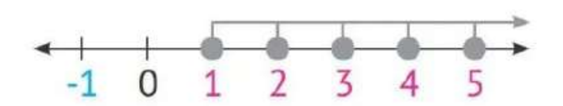
c) $x \leqslant -2$: All values Less than or equal -2 .

d) $x \geqslant 4$: All values Greater than or equal 4 .

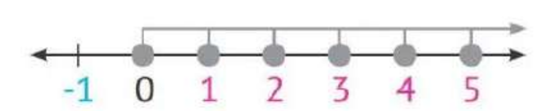
Important Notes:

- The sets of numbers can be represented as the following:

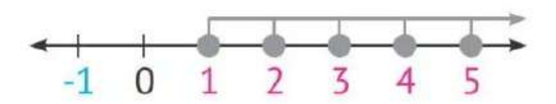
The set of counting numbers
$X \geq 1$ or $X > 0$



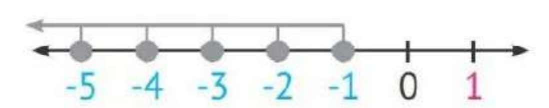
The set of natural numbers
$X \geq 0$ or $X > -1$



The set of positive integer
$X > 0$ or $X \geq 1$

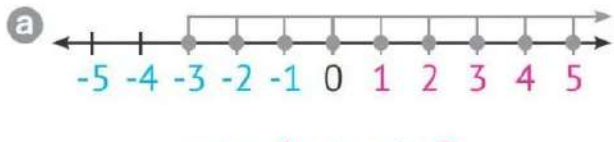


The set of negative integer
$X < 0$ or $X \leq -1$

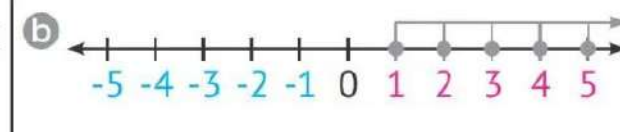




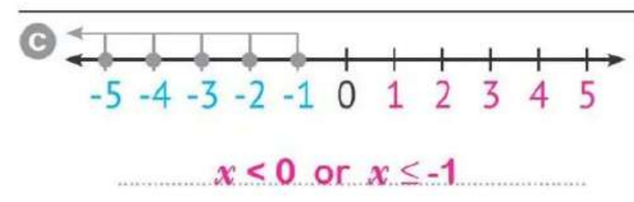
5 Write the suitable inequality represented by the following number line in a set of integers:

ⓐ 

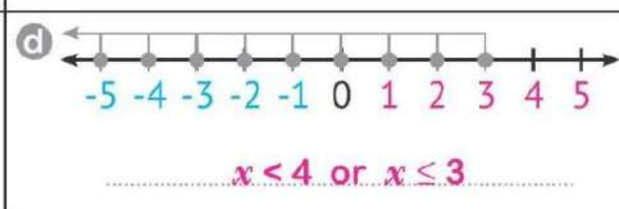
$x > -4$ or $x \geq -3$

ⓑ 

$x > 0$ or $x \geq 1$

ⓒ 

$x < 0$ or $x \leq -1$

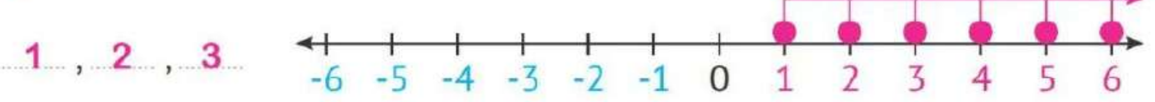
ⓓ 

$x < 4$ or $x \leq 3$

6 Name 3 solutions to each inequality. Then graph the inequality on a number line in the set of integers: *There are many answers*

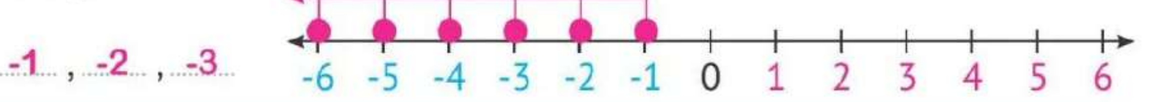
ⓐ $x > 0$

1 , 2 , 3



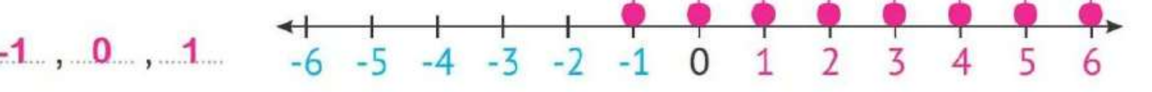
ⓑ $x < 0$

-1 , -2 , -3



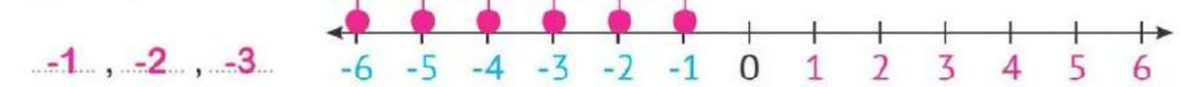
ⓒ $x \geq -1$

-1 , 0 , 1



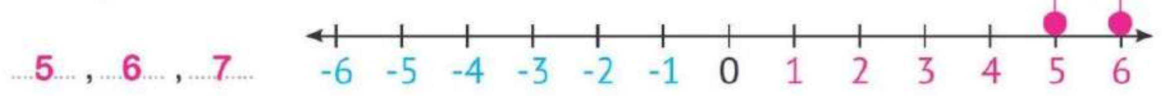
ⓓ $x \leq -1$

-1 , -2 , -3



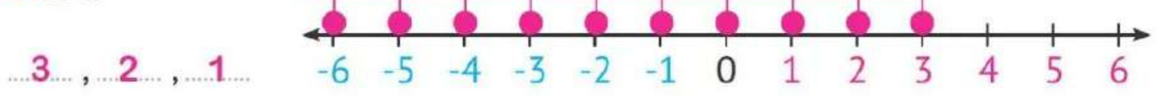
ⓔ $x > 4$

5 , 6 , 7



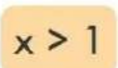
ⓕ $x \leq 3$

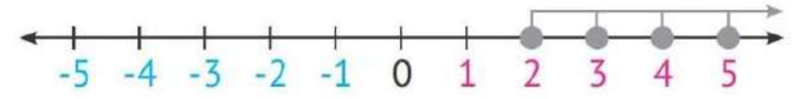
3 , 2 , 1

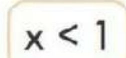


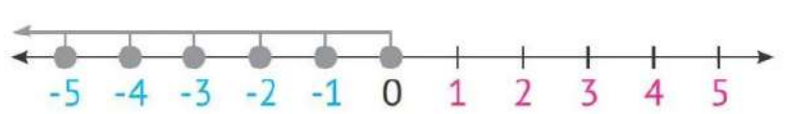


• **The representation of the inequalities $x > 1$, and $x < 1$ on the number line (where x is an integer)**









The two inequalities are similar in:

- The number 1 does not belong to the solution set in each of them.

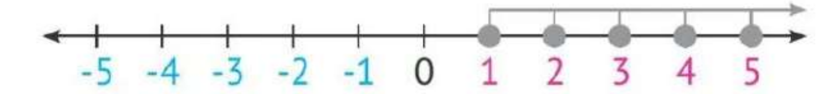
The two inequalities differ in:

- Each of them represents the values in two opposite directions from the number 1.
- They have no common points.

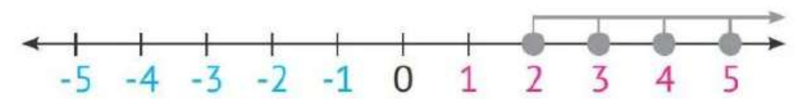


• **The representation of the inequalities "$x \geq 1$", and "$x > 1$" on the number line of the inequalities (where x is an integer number).**

$x \geq 1$



$x > 1$



The two inequalities are similar in:

- Each of them represents the values to the right of the number 1.
- There are many common points between them.

The two inequalities differ in:

- The number 1 does not belong to the solution set in the inequality "$x > 1$".
- The number 1 belongs to the solution set in the inequality "$x \geq 1$"..

7 **Choose all the correct sentences about the representation of the inequalities ("$x > -2$" and "$x < -2$") on the number line:**

ⓐ −2 belongs to the solution set in each of them. (✗)

ⓑ −2 belongs to the solution set in one of them. (✗)

ⓒ The inequality "$x > -2$" includes all values to the left of −2 on the number line. (✗)

ⓓ The inequality "$x > -2$" includes all values to the right of −2 on the number line. (✓)

ⓔ They have no points in common. (✓)

8 **Record each true statement about the graphs of ("$x > -2$" and "$x \geq -2$") on the number line.**

ⓐ −2 belongs to the solution set in each of them. (✗)

ⓑ −2 belongs to the solution set in one of them. (✓)

ⓒ The inequality "$x \geq -2$" includes all values to the left of −2 on the number line. (✗)

ⓓ The inequality "$x > -2$" includes all values to the right of −2 on the number line. (✓)

ⓔ They have no points in common. (✗)

Theme 1



10

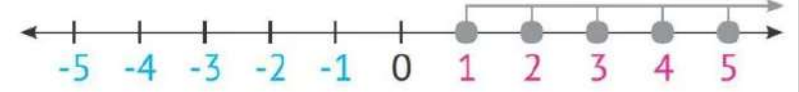
1 Write in a verbal method:

a) $x > -5$ .... All values greater than -5 ....

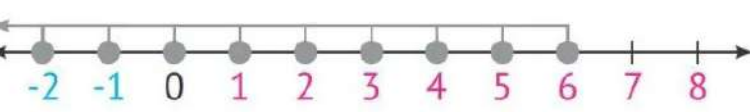
b) $x \leq 2$ .... All values less than or equal 2 ....

2 Write the inequality representing the number line in the set of integers:

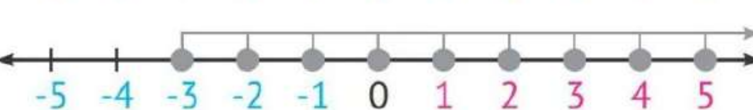
a) ..$x > 0$ or $x \geq 1$



b) ..$x < 7$ or $x \leq 6$



c) ..$x > -4$ or $x \geq -3$



3 Choose the correct answer:

a) The inequality representing the statement "All values greater than" 2 is ....

($x > 2$ or $x < 2$ or $x \leq 2$ or $x \geq 2$)

b) The inequality that represents the statement "All values to the right of -1 on a number line" is ....

($x > -1$ or $x < -1$ or $x \leq -1$ or $x \geq -1$)

c) Which of the following values is a solution to the inequality "$x > -1$"?

(1 or -3 or -2 or -5)

Theme 2

Mathematical Operations and Algebraic Thinking (Statistics and Data Analysis)



Theme Units

Unit 5 Dependent and Independent Variables

Concept 5.1: Explore Relationships Between Two Variables

Unit 6 Data Distributions

Concept 6.1: Applications on Collecting and Representing Data

Unit 7 Measures of Central Tendency and Spread

Concept 7.1: Exploring Measures of Central Tendency and Spread



Unit 5 Dependent and Independent Variables



Concept 5.1 Explore Relationships Between Two Variables

Lessons 1&2 The Relationship Between Dependent and Independent Variables Applications on Dependent and Independent Variables

Learning Objectives:

By the end of these lessons, the student will be able to:

- Identify relationships within the context of going to an amusement park.
- Explore and apply formal definitions of independent variables and dependent variables.
- Examine and create algebraic equations to model real-life situations.

Lesson 3 Analyzing the Relationship Between Dependent and Independent Variables

Learning Objective:

By the end of this lesson, the student will be able to:

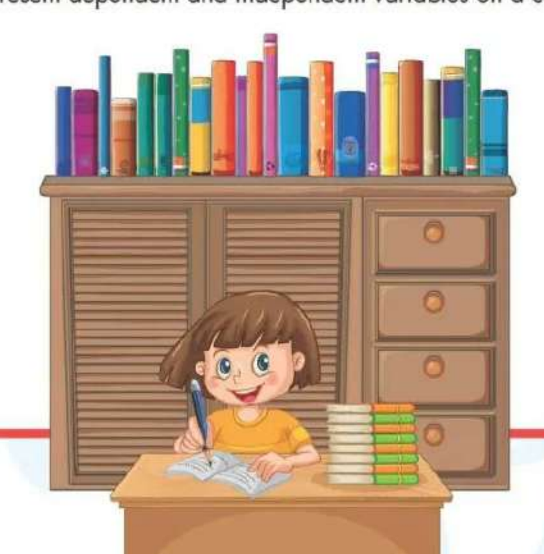
- Discover how to use independent and dependent variables when writing equations.

Lesson 4 Graph Representation for Dependent and Independent Variables

Learning Objectives:

By the end of this lesson, the student will be able to:

- Connect representations of dependent and independent variables in tables, equations, and graphs.
- Represent dependent and independent variables on a coordinate plane.





The Relationship Between Dependent and Independent Variables & Applications on Dependent and Independent Variables

Dependent and Independent Variables

Variable

Independent Variable

- It's a variable whose value is not determined by any other value or variable.
- Therefore, any value can be assigned to it.

Dependent Variable

- It's an outcome variable that is determined by or based on the other variable (independent) as the input.

Ex. If the price of one pen is 5 pounds, then the price of:

	Constant		Independent Variable		Dependent Variable	
2 pens:	5	X	2	=	10	pounds
3 pens:	5	X	3	=	15	pounds
4 pens:	5	X	4	=	20	pounds
5 pens:	5	X	5	=	25	pounds

- The price of the pen is **constant**.
- The number of purchased pens is a variable **(an independent variable)**.
- The total purchase price of any number of pens is a variable **(a dependent variable)**.
- The total purchase price of pens depends on the number of pens purchased. As the number of pens changes, the total price of pens also changes.

- If we denote the number of pens by the symbol x and the total purchase price by the symbol y, the equation that represents the relationship between the number of pens and the total purchase price is:



- The independent variable is usually denoted by " x " and the dependent variable is denoted by " y ".
- Other symbols may be used.

1 **Determine the independent and dependent variables in each of the following situations:**

a **The number of study hours and the exam result:**

- Independent variable: The number of study hours
- Dependent variable: The exam result

b **The job and level of education:**

- Independent variable: Level of education
- Dependent variable: The job

c **The distance traveled by a car and fuel consumption:**

- Independent variable: The distance traveled by car
- Dependent variable: Fuel consumption

d **The amount paid and the number of chocolate bars:**

- Independent variable: The number of chocolate bars
- Dependent variable: The amount paid



2 **Determine the independent variable and the dependent variable in each of the following relationships:**

Relationship	$x + 3 = y$	$m - 2 = z$	$s \times 7 = a$	$f = \frac{t}{7}$
Independent Variable	x	m	s	t
Dependent Variable	y	z	a	f

Ex. **The price of one kilogram of bananas is 9 pounds, and the price of x kilograms of bananas is y pounds.**

ⓐ The equation that represents the relationship between the weight of bananas "x" and the purchase price "y" is $y = 9x$.

ⓑ The independent variable is "x".

ⓒ The dependent variable is "y".

ⓓ The price of 5 kilograms of bananas is 9 X 5 = 45 pounds.

3 **Sameh is 6 years younger than his brother Ahmed. If Sameh is x years old and Ahmed is y years old:**

ⓐ The equation that represents the relationship between their ages is:

$y = x + 6$.

ⓑ The independent variable is:

x.

ⓒ The dependent variable is:

y.

ⓓ If Sameh is now 12 years old, the age of Ahmed now is:

The age of Ahmed now = 12 + 6 = 18 years old.

4 In the amusement park, tickets are purchased to be used in each of the games. The following table shows the number of tickets required to ride each game for one time. Complete the table.

- Write an equation that represents the relationship between:
  "x": The number of times to ride a game.
  "y": Total number of tickets needed.
- Calculate the number of tickets required to ride each game 8 times.

Game	Ferris Wheel	Swing	Roller Coaster	Rotary Cars
Number of Tickets Required to Ride the Game 1 Time	3 Tickets	4 Tickets	6 Tickets	8 Tickets
The Equation	$y = 3x$	$y = 4x$	$y = 6x$	$y = 8x$
Number of Tickets Required to Ride the Game 8 Times	3 X 8 = 24	4 X 8 = 32	6 X 8 = 48	8 X 8 = 64



/ 10

1 Complete the following:

ⓐ In the equation $y = 12x$, the independent variable is x, and the dependent variable is y .

ⓑ If the value of the electricity bill depends on the amount of electricity consumption, then:
The independent variable is The amount of electricity consumpition.
The dependent variable is The value of electricity bill .

ⓒ If the independent variable is the number of times the player hits the target and the dependent variable is the number of points the player gets, then The number of paints depends on The number of time of hits .

2 Esraa saves 100 pounds every month. Complete:

ⓐ The equation that represents the relationship between the number of months "x" and the total money she saved "y" is $y = 100x$.

ⓑ The independent variable is x .

ⓒ The dependent variable is y .

ⓓ The money she saved in 6 months is 100 X 6 = 600 L.E .



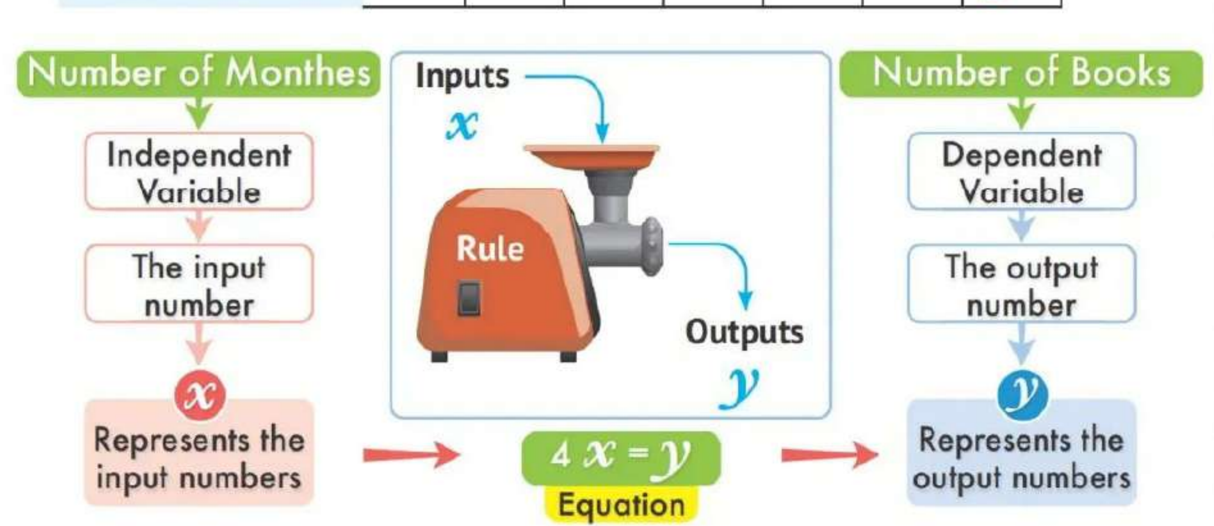
Analyzing the Relationship Between Dependent and Independent Variables

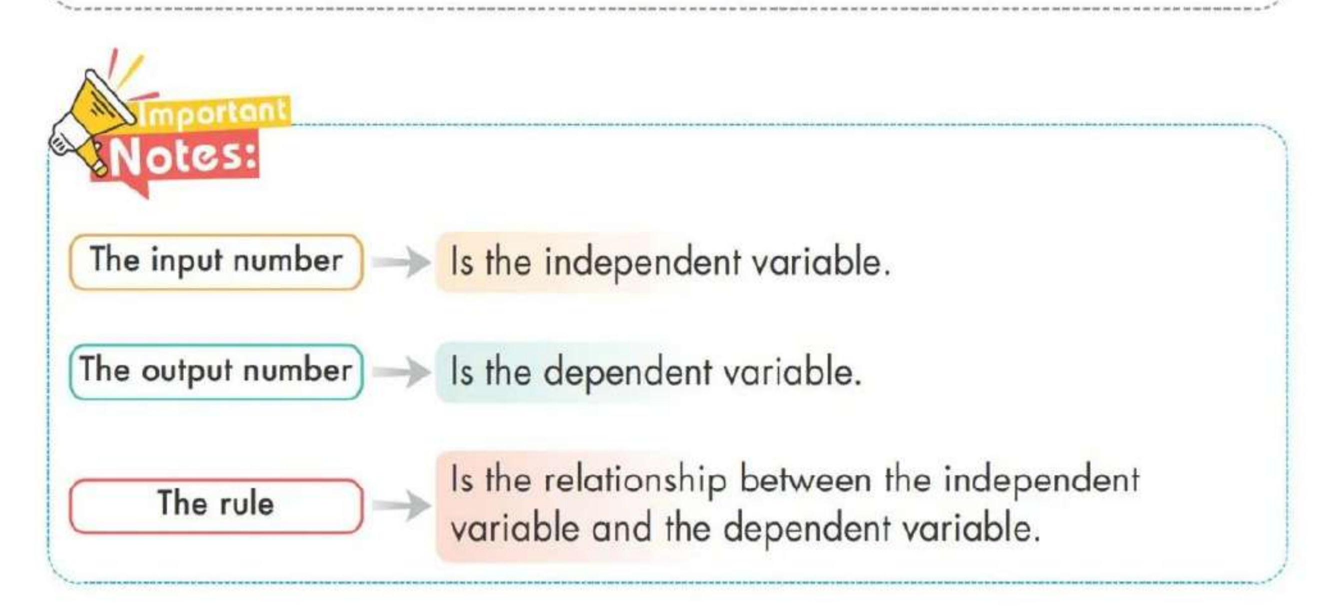
Rules, Variables, and Equations - Inputs/Outputs

- If the average number of books a person reads per month is 4, note the following table:

Number of Months	1	2	3	4	5	6	x
Number of Books	4	8	12	16	20	24	y

X4







Rule	Equation
Multiply by 3	$y = 3x$
Add 5	$y = x + 5$
Divide by 8	$y = x \div 8$
Subtract 7	$y = x - 7$
Multiply by 5, then subtract 2	$y = 5x - 2$
Add 3, then divide by 7	$y = (x + 3) \div 7$



Note:
- When adding or subtracting before division or multiplication, you must use **parentheses**.

1 Use the variables x and y, where x is an independent variable. Write the **rule** and **equation** for each of the following:

	Rule	Equation
a	Multiply by 8	$y = 8x$
b	Add 9	$y = x + 9$
c	Divide by 3	$y = \frac{x}{3}$
d	Multiply by 3 then add 7	$y = 3x + 7$
e	Subtract 3 then divide by 2	$y = (x - 3) \div 2$

Finding the Rule and Equation from the Table

- You can't always know the correct rule for a pattern with one input and one output. You may need more than one input and output.

Ex. **Notice the following patterns:**

a

Inputs (x)	1	3	5	7
Outputs (y)	4	6	8	10

- Rule: Add 3
- Equation: $y = x + 3$

b

Inputs (x)	8	16	24	32
Outputs (y)	2	4	6	8

- Rule: Divide by 4
- Equation: $y = x \div 4$

2 **Notice each table, identify the rule, then complete the pattern:**

a

Inputs (x)	4	6	8	10	12
Outputs (y)	6	8	10	12	14

- Rule: add 2
- Equation: $y = x + 2$

b

Inputs (x)	6	8	9	10	14
Outputs (y)	1	3	4	5	9

- Rule: subtract 5
- Equation: $y = x - 5$

c

Inputs (x)	6	9	12	15	18
Outputs (y)	2	3	4	5	6

- Rule: divide by 3
- Equation: $y = x \div 3$

d

Inputs (x)	2	3	4	5	6
Outputs (y)	8	12	16	20	24

- Rule: multiply by 4
- Equation: $y = 4x$

- A pattern rule can consist of more than one operation.

Ex. Notice the following patterns:

a

x	3	5	7	8
y	10	16	22	25

- Rule: Multiply by 3, then add 1.
- Equation: $y = 3x + 1$

b

x	5	9	13	21
y	2	4	6	10

- The rule: Subtract 1, then divide by 2.
- Equation: $y = (x - 1) \div 2$

3 Notice each table and determine the rule. Write an equation, then complete the pattern in each of the following tables:

a

x	2	4	8	10	5
y	4	10	22	28	13

- Rule: multiply by 3 then subtract 2
- Equation: $y =$ $3x - 2$

b

x	9	6	12	15	18
y	2	1	3	4	5

- Rule: Divide by 3 then subtract 1
- Equation: $y =$ $x \div 3 - 1$

c

x	4	3	2	6	5
y	10	8	6	14	12

- Rule: add 1 then multiply the sum by 2
- Equation: $y =$ $(x + 1) \times 2$

d

x	7	13	9	3	5
y	3	6	4	1	2

- Rule: Subtract 1 then divide the result by 2
- Equation: $y =$ $(x - 1) \div 2$

4 Complete the following statements using the variables x and y:

a If the rule is "multiply by 2", then the equation is $y = 2x$.

So, If $x = 2.3$, then $y =$ $2 \times 2.3 = 4.6$.

b If the rule is "add 6", then the equation is $y = x + 6$.

So, If $x = \frac{1}{5}$, then $y =$ $\frac{1}{5} + 6 = 6\frac{1}{5}$.

ⓒ If the rule is "multiply by 3, then add 4",

the equation is $y = 3x + 4$.

So, If $x = 5$, then $y =$ $3 \times 5 + 4 = 19$.



10

1 Complete the following:

ⓐ If the rule is "add 8", then the equation is $y = x + 8$.

ⓑ The equation that expresses the rule "subtract from 3.2" is

$y = 3.2 - x$.

ⓒ If the equation is $y = 5(x + 2)$, and $x = 5$, then $y =$ $5 \times (5 + 2) = 35$.

2 Choose the correct answer:

ⓐ The equation that expresses the rule "multiply by 4" is ....

($y = 3x$ or $y = 4 + x$ or $y = 4x$ or $y = x$)

ⓑ The equation that expresses the rule "multiply by 2, then add 5" is ....

($y = 5x + 2$ or $y = 2(x + 5)$ or $y = 5(x + 2)$ or $y = 2x + 5$)

ⓒ If $y = 2x + 3$, and $x = 2$, then $y =$ .... (10 or 7 or 13 or 17)

3 Notice the following table, identify the rule, and then complete the pattern:

Inputs (x)	1	2	3	4	5
Outputs (y)	10	15	20	25	30

- Rule: Add 1 then multiply by 5
- Equation: $y =$ $(x + 1) \times 5$

Theme 2



Graph Representation for Dependent and Independent Variables

Representing the Dependent and Independent Variables

To represent the independent and dependent variables on a coordinate plane as a graph:

- Put the independent (input) variable on the x-axis (horizontally).
- Put the dependent (output) variable on the y-axis (vertically).

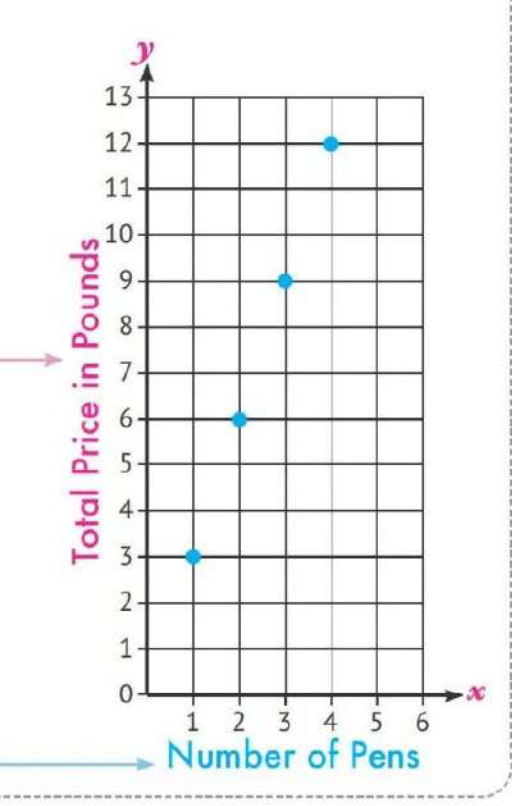
Ex. **The following table represents the number of pens and their total price:**

Number of Pens (x)	1	2	3	4
Total Price in Pounds (y)	3	6	9	12
• Points (x, y) →	(1, 3)	(2, 6)	(3 , 9)	(4 , 12)

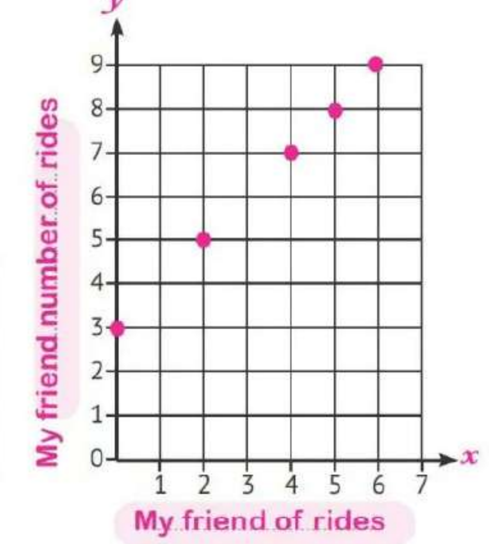
The equation that represents the relationship between the variables x and y is ($y = 3x$)

(Vertically) Total price in pounds (dependent variable) is represented on the y-axis.

The number of pens (independent variable) is represented on the x-axis. (Horizontally)



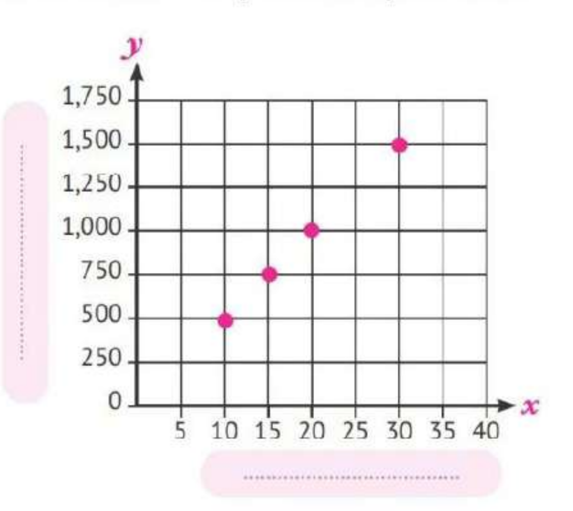
1 You went on three fewer rides than your friend because she got to the amusement park earlier than you. Complete the following table, where x represents the number of your rides and y represents the number of your friend's rides at different times during your amusement park visit. Write an equation to represent the relationship in the table you made. Then, represent that relationship graphically.



The equation is: $y = x + 3$

x	0	2	4	5	6
y	3	5	7	8	9
Points	(0 , 3)	(2 , 5)	(4 , 7)	(5 , 8)	(6 , 9)

2 The value of participating in one of the school trips is 50 pounds. If the number of subscribers is "x" and the total value of subscriptions is "y", write an equation that shows the relationship between the number of subscribers and the total subscriptions.
Complete the table and graph it.



The equation is: $y = 50x$

x	10	15	20	30
y	500	750	1,000	1,500
Points	(10 , 500)	(15 , 750)	(20 , 1,000)	(30 , 1,500)

Theme 2



10

1 Complete the following:

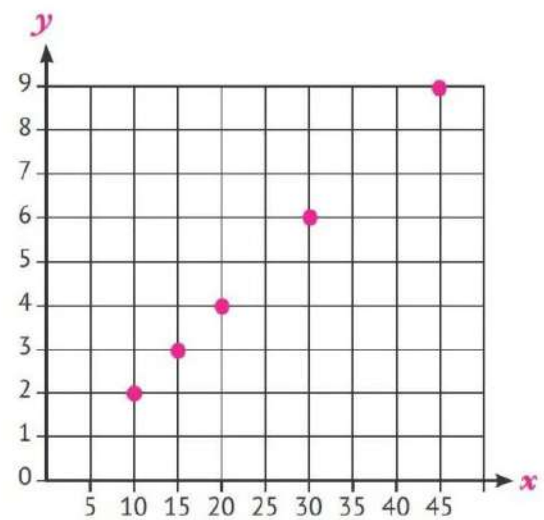
a. The independent variable is represented on the ...x... -axis.

b. The dependent variable is represented on the ...y... -axis.

c. x-axis is the **Horizontal** axis.

d. ...y... -axis is the vertical axis.

2 If the equation is $y = \frac{1}{5}x$, then complete the following table and graph it:



x	10	15	20	30	45
y	2	3	4	6	9
Points	(10 , 2)	(15 , 3)	(20 , 4)	(30 , 6)	(45 , 9)



Unit 6 Data Distributions



Concept 6.1 Applications on Collecting and Representing Data

Lesson 1 Data and Statistical Questions

Learning Objectives:

By the end of this lesson, the student will be able to:
- Explore statistical questions and data.
- Compare and contrast statistical and non-statistical questions.

Lessons 2&3 Exploring the Histogram
Representing Data Using Histograms

Learning Objectives:

By the end of these lessons, the student will be able to:
- Review characteristics of dot plots and bar graphs.
- Explore and discover characteristics of histograms.
- Create a histogram for a given set of data.
- Collect data using number cubes and create a histogram for that data.

Lesson 4 Exploring Box Plot

Learning Objective:

By the end of this lesson, the student will be able to:
- Calculate the median and 5-point summary of a data set and describe how these values are represented on a box plot.

Lesson 5 Applications on Data Representations

Learning Objective:

By the end of this lesson, the student will be able to:
- Analyze data displays to determine which is most appropriate when answering statistical questions.



Lesson 1 Data and Statistical Questions

Statistical Questions and Non-Statistical Questions

- The type of question is determined by the data we get from answering these questions.

Statistical Question

- It's a question for which we have many possible answers.

For example: How old are the students in your class?

It is a statistical question because we expect a change in the ages of the students.

Non-Statistical Question

- It's a question for which we have only one answer.

For example:

"How old are you?"

It is a non-statistical question because we expect only one answer.

1 **Select the type of each of the following questions:**
(a statistical question or a non-statistical question)

	The question	Statistical	Non-Statistical
a	What are the students' favorite colors?	✓	
b	How many family members does each student have in the class?	✓	
c	How many students are in the class?		✓
d	How many books do the class students read in a year?	✓	
e	What is the name of your school?		✓
f	Do you like the red color?		✓
g	How many emails do students write?	✓	
h	How many books have you read in the last year?		✓

Types of Statistical Questions

- The type of statistical question is determined by the type of data we get from answering these questions.

A Numerical Statistical Question

Results in numerical (quantitative) data.

It is data written in the form of numbers to express the measurement of a specific phenomenon.

For example:

Weight, temperature, height, age, number of working hours, ...

A Categorical Statistical Question

Results in descriptive data.

It is data written in the form of adjectives or words to describe the status of members of society.

For example:

Marital status, favorite food, favorite color, place of birth, blood type, ...

2 **Determine whether the results from each question would give you numerical data or categorical data.**

	The question	Numerical Data	Categorical Data
a	How many letters are in the first name of each student in your class?	✓	
b	What are the favorite colors of the students in your class?		✓
c	What kinds of films do the students in your class like?		✓
d	What color are the eyes of the students in your class?		✓

e	How many people do each of the students in your class have in their families?	✓	
f	What television programs do the students in your class prefer?		✓
g	What are the scores of all your math tests during the current evaluation period?	✓	
h	How many pets do pupils have in your class?	✓	

Quiz

10

1 Complete the following:

a The types of questions are **statistical** questions and **Non-statistical** questions.

b The types of statistical data are **Numerical** data and **categorical** data.

c The numerical data is written in the form of **numbers** .

d The categorical data is written in the form of **words** .

e "What color are the pupils' eyes in your class?"
is a .... question. (statistical / non-statistical)

2 Choose the correct answer:

a .... are categorical data.
(Dates of birth or Ages or Weights or Favorite colors)

b .... are numerical data.
(Salaries or Favorite sports or Eye colors or Nationalities)

c All the following data are categorical data, except ....
(birth places or lengths or names or colors)

d All the following data are numerical, except ....
(types of pets or test scores or ages or number of pets)

e "What is your weight?" is a .... question.
(numerical statistical or categorical statistical or non-statistical)



Exploring the Histogram
Representing Data Using Histograms

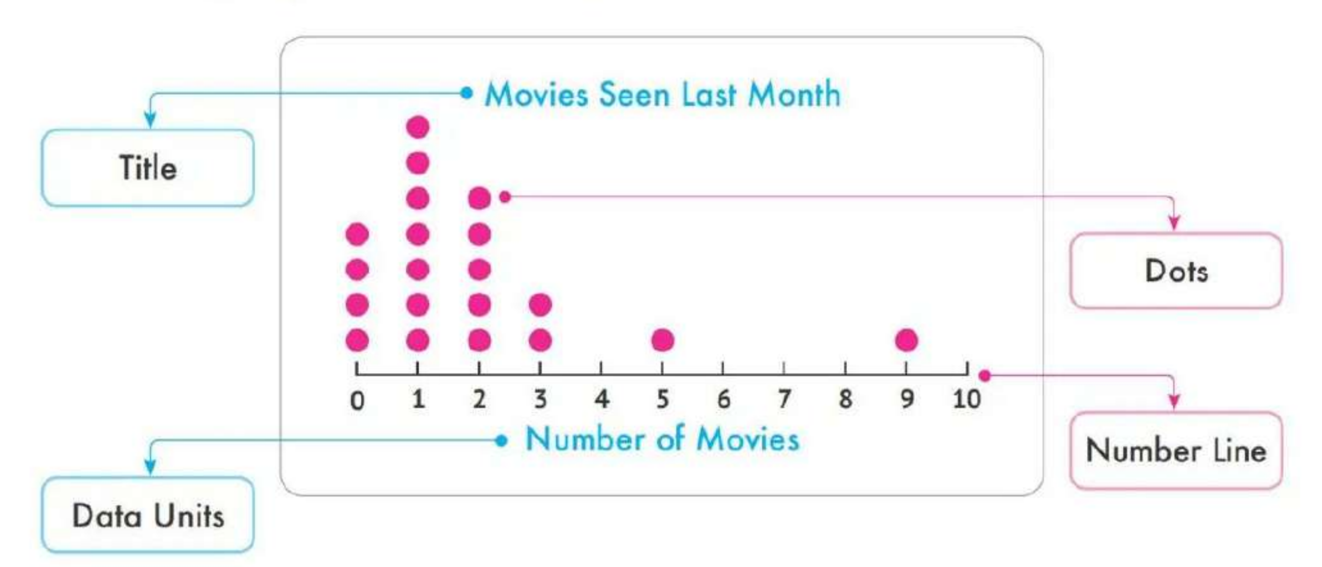
Dot Plots

- It is used to represent repeated numerical data on a horizontal number line.

Characteristics that all dot plots share:

- Titles.
- Data graphed above a number line.
- Each individual piece of data can be seen on a dot plot and is represented by a dot.
- The number lines in dot plots should be labeled with the units used to measure the data.

Ex. **The following dot plot represents the number of movies that 20 people watched last month:**



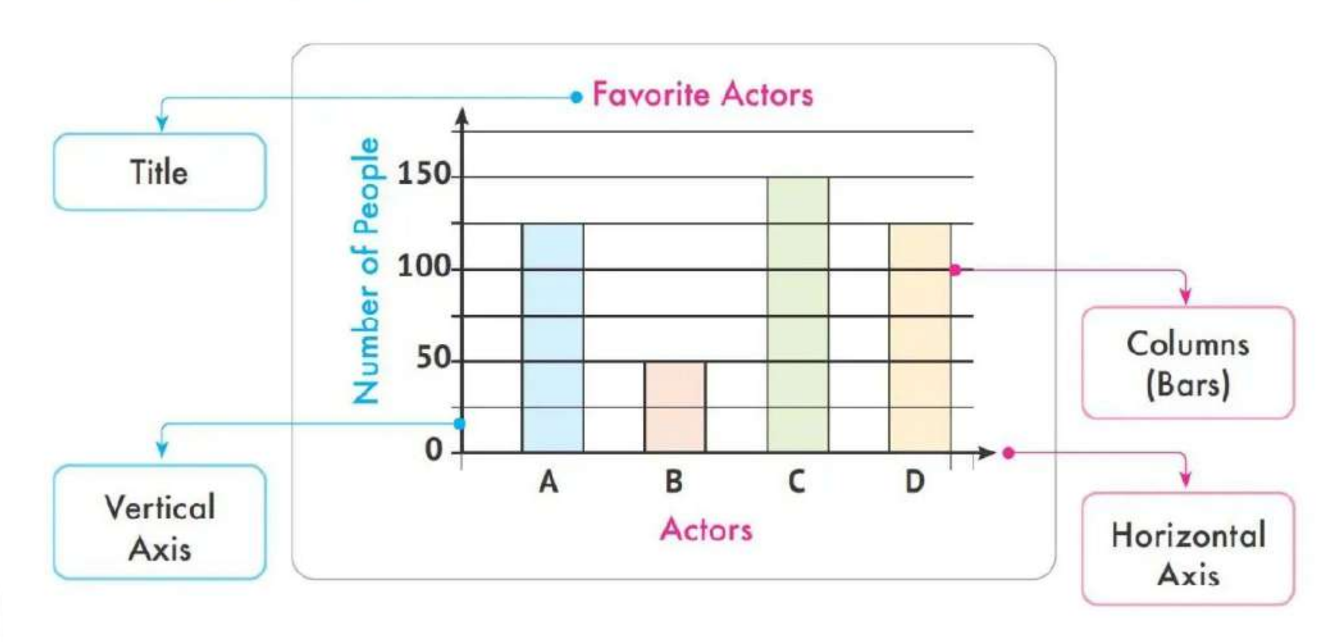
Bar Graph

- It is used to represent categorical and numerical data.

Characteristics that all bar graphs share:

- Titles.
- Two axes:
  - Horizontal axis to represent data, which can be anything.
  - Vertical axis has a scale.
- Labels for each axis.
- Shows categorical data.
- Bars represent data.
- Each bar represents one category or one value.
- Equal gaps between bars.
- Bars can be rearranged.

Ex. **The opposite bar graph shows the preferred actors of a number of people.**



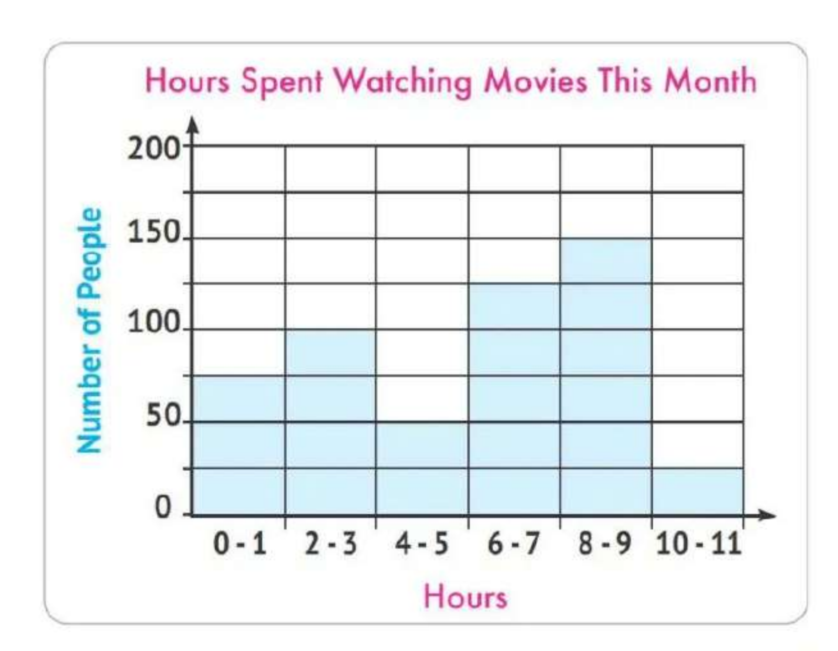
Histograms

- It is used to represent numerical data only.

Characteristics that all histograms share:

- Titles.
- Two axes:
  - Horizontal axis to represent data, which can be anything.
  - Vertical axis has a scale.
- Labels for each axis.
- Shows numerical data.
- Bars represent data.
- No gaps between bars
  [unless data are not given in a specific interval].
- Bars should not overlap.
- Bars can not be rearranged.

Ex. **The following histogram represents the number of hours spent watching movies by a number of people.**



Comparing Bar Graphs and Histograms

Bar Graph

- It can show categorical and numerical data.
- Each bar represents one number, one number interval, or one category.
- It requires equal spaces between each bar or a different color for each bar.

Histogram

- It displays numerical data.
- Each bar represents an interval.
- There is no space between the bars unless there is no data for a particular interval.

Both of Bar Graphs and Histograms

- Have horizontal and vertical axes.
- Can display numerical data.
- Have titles and labels for both axes.
- Need a scale for the vertical axis.
- Use bars to represent the data.

1 **What is the best graph for the following situations?**

(Bar graph) or (Histogram)

ⓐ How many students got grades in the final exam from 80 to 89? (........Histogram........)

ⓑ What are all the students' heights rounded to the nearest centimeter in your class? (........Bargraph........)

ⓒ What are the favorite colors of the students in your class? (........Bargraph........)

ⓓ What are the math test scores for the month of November? (........Bargraph........)

ⓔ How many films are 60 to 80 minutes long? (........Histogram........)

ⓕ What is the number of amusement park visitors during the week days? (........Bargraph........)

Creating Histograms to Represent Data

Ex. **The following frequency table shows the weights in the students of a class consisting of 40 students.**

- It can be represented graphically by bar graph, as follows:

Weight in Kilograms	35	36	37	38	39	40	41	42	43	44	45	46
Frequency (Number of Students)	1	2	3	5	4	6	4	5	4	3	2	1



To Create a Histogram to Display the Previous Data

- This data must be placed at suitable intervals, as follows:

1 Choose an interval size that makes sense for this data set.

So that each interval consists of 3 items, and therefore the number of intervals is (4).

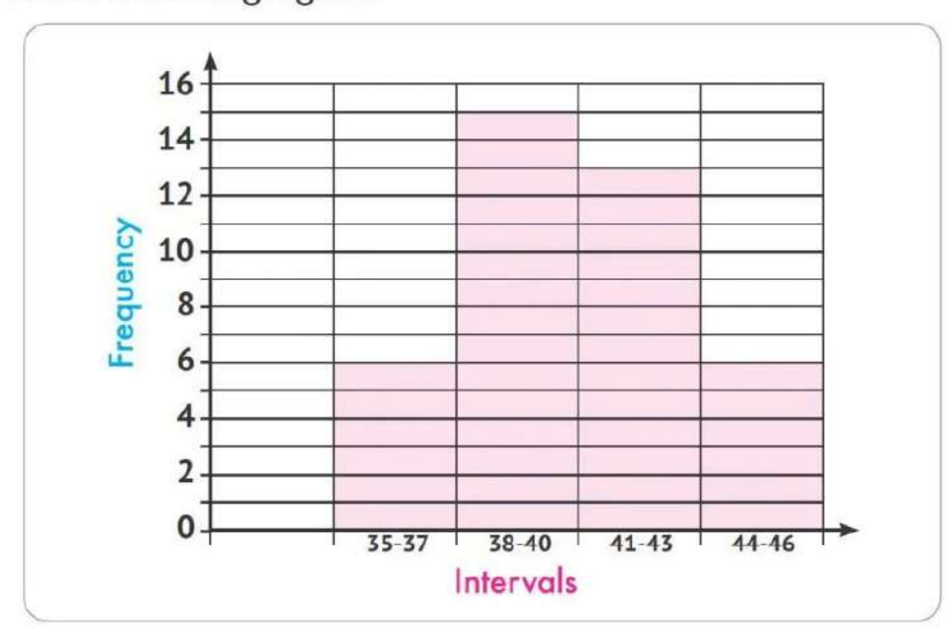
2 Compile the previous frequency table, as follows:

Weight in Kg	Frequency
35	1
36	2
37	3
38	5
39	4
40	6
41	4
42	5
43	4
44	3
45	2
46	1

Intervals	Frequency
35 – 37	6
38 – 40	15
41 – 43	13
44 – 46	6

To create a histogram using the previous frequency distribution table:

- On the horizontal axis, place the intervals.
- On the vertical axis, place frequencies. Label this axis "Frequency".
- Draw a bar for each interval without leaving spaces between these bars as shown in the following figure.





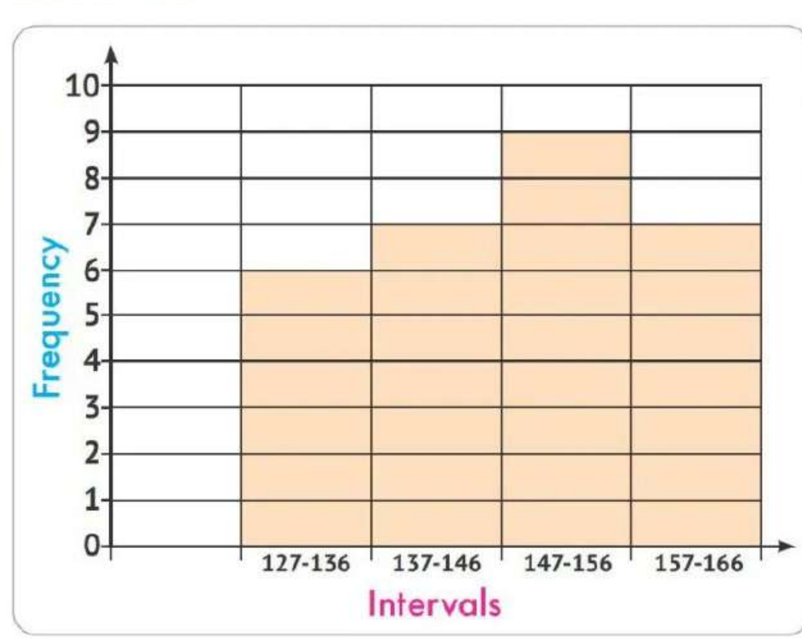
The following frequency table shows the data collected by the students. Draw a histogram showing this data. Make sure to choose an appropriate interval for this data set:

Arm Span (cm)	Frequency
127	2
132	3
135	1
138	1
141	1
142	2
143	1
144	2

Arm Span (cm)	Frequency
147	2
149	2
152	3
153	2
157	2
158	3
160	1
166	1

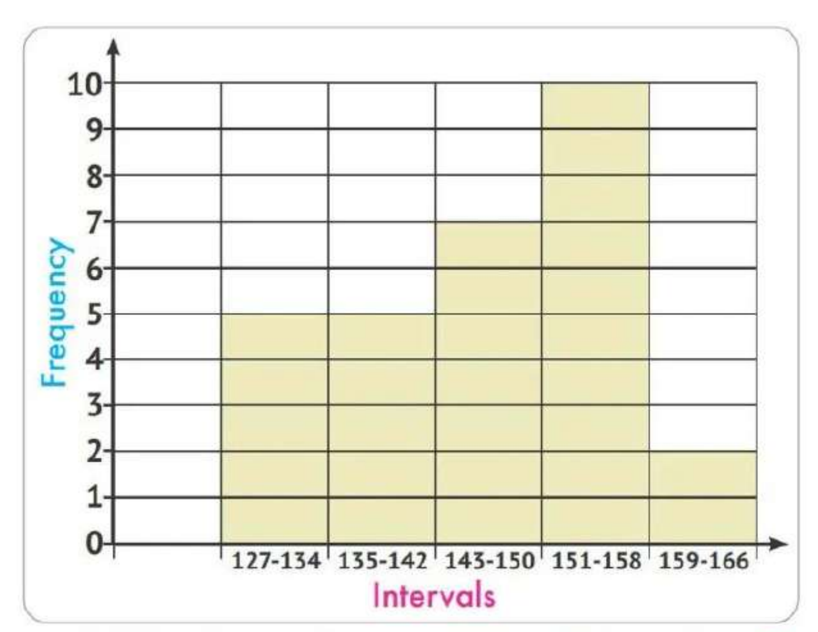
- From the previous table, we make a table of intervals where the length of the interval is **10** items.

Intervals	Frequency
127 – 136	6
137 – 146	7
147 – 156	9
157 – 166	7



- Intervals of length 8 items can be created.

Intervals	Frequency
127 – 134	5
135 – 142	5
143 – 150	7
151 – 158	10
159 – 166	2

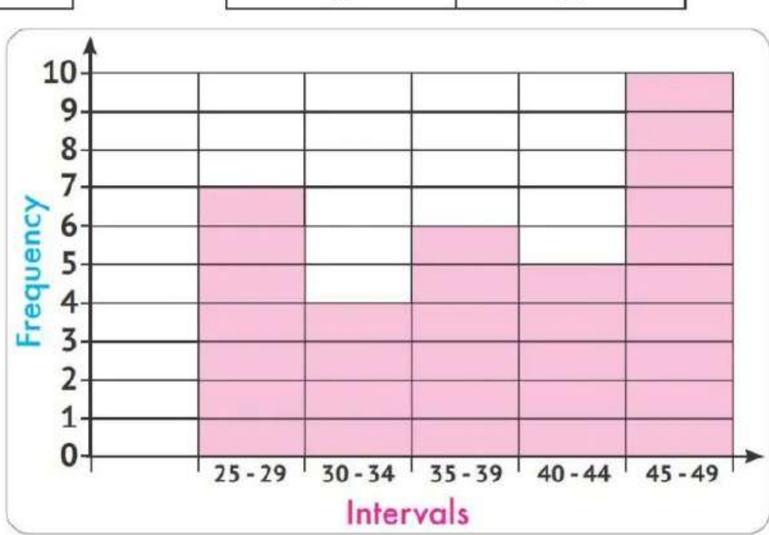


2 **The following frequency table shows the grades obtained by 32 students in mathematics in the first semester:**

Grades	Frequency
25	3
26	1
28	3
30	1
32	2
34	1
35	1
36	2
38	1

Grades	Frequency
39	2
40	1
42	3
44	1
45	3
46	1
47	1
48	3
49	2

Intervals	Frequency
25 - 29	7
30 - 34	4
35 - 39	6
40 - 44	5
45 - 49	10





/10

1 Match each of the following situations with the best graph to represent it:

ⓐ How many students do their families consist of 4 people? ② Dot plots

ⓑ How many sixth-grade students are there in your school classes? ③ Bar Graph

ⓒ How many students in your class are 130 – 150 cm tall? ① Histogram

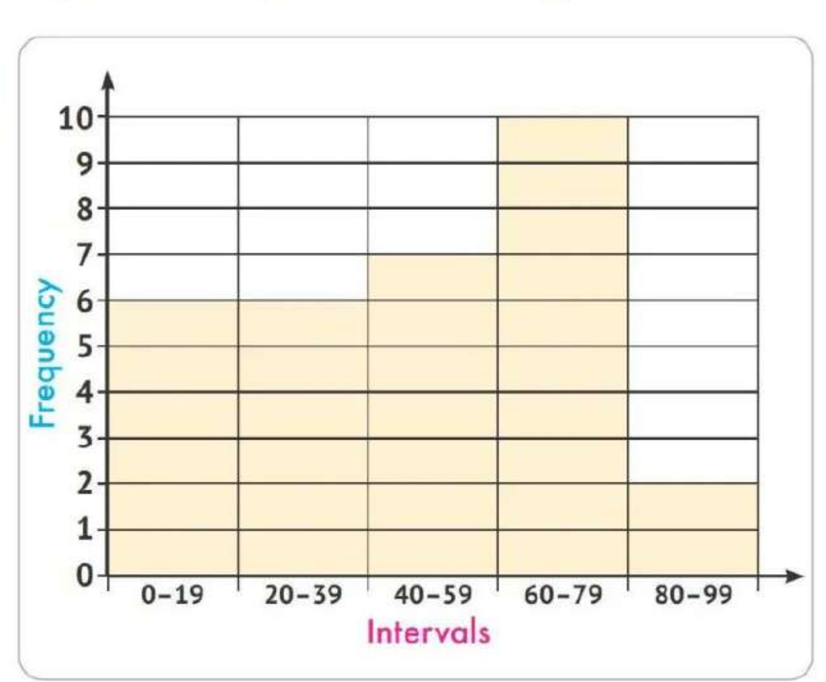




Bar Graph 3

2 Use the following histogram to complete the following interval table:

Intervals	Frequency
0 – 19	6
20 – 39	6
40 – 59	7
60 – 79	10
80 – 99	2



Theme 2



Lesson 4 Exploring Box Plot

The Median

- It's the value of the element appearing at the middle of the data set when the data are arranged in order (an ascending order or a descending order).
- If the data set has an even number of values, then the median is half the sum of the two values at the middle.

For example: Write the median for each of the following data sets:

a 3, 5, 8, 3, 7

The order: 3, 3, 5, 7, 8

Median: 5

b 7, 9, 3, 4, 4, 6

The order: 3, 4, 4, 6, 7, 9

Median: $(4 + 6) \div 2 = 5$

1 Find the median for each of the following data sets:

a 5 , 9 , 9 , 2 , 4

The order: 2 , 4 , 5 , 9 , 9 .

Median: 5

b 2 , 0 , 5 , 8 , 11 , 7

The order: 0 , 2 , 5 , 7 , 8 , 11 .

Median: $(5 + 7) \div 2 = 6$

c 3 , 9 , 1 , 8 , 2 , 3 , 6

The order: 1 , 2 , 3 , 3 , 6 , 8 , 9 .

Median: 3

d 2 , 0 , 5 , 8 , 11 , 6 , 5 , 7

The order: 0 , 2 , 5 , 5 , 6 , 7 , 8 , 11 .

Median: $(5 + 6) \div 2 = 5.5$

Box Plots

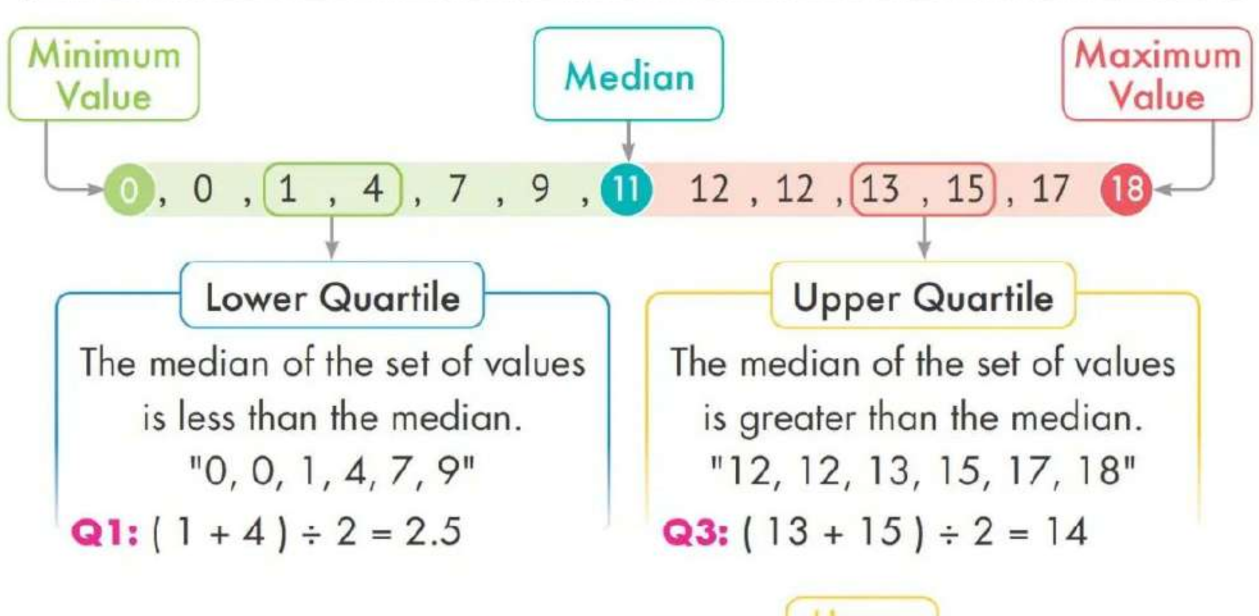
- It's a data display that represents numerical data based on a 5-point summary of the data set.

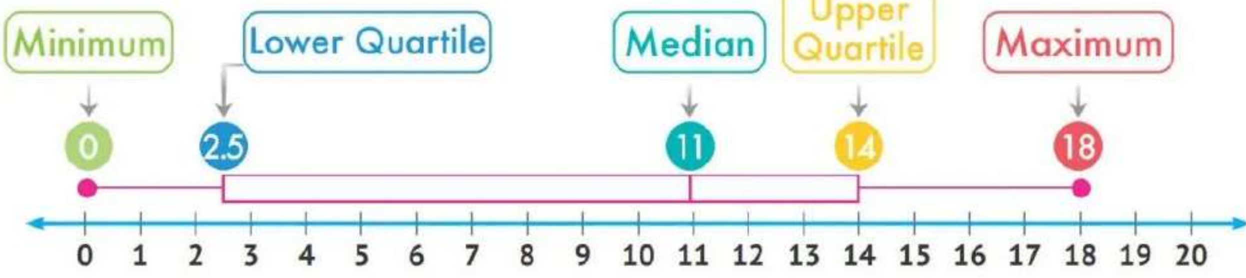
  1 The minimum value
  2 The first quartile (Q1) or (Lower Quartile)
  3 The second quartile (Q2) or (Median)
  4 The third quartile (Q3) or (Upper Quartile)
  5 The maximum value

Ex. **Draw a box plot to represent the following values:**

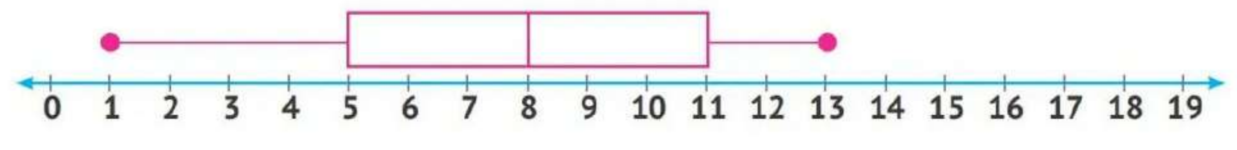
15, 17, 13, 11, 12, 9, 0, 12, 18, 4, 7, 1, 0

- To draw a box plot for the set of displayed values, the 5-point summary must be specified after arranging this data in an ascending order:





2 **Using the following box plot, identify the 5-point summary of the data set:**



a) Minimum Value: 1

b) Lower Quartile: 5

c) Median: 8

d) Upper Quartile: 11

e) Maximum Value: 13

3 **Draw the box plots for each of the following groups of values:**

a) 2 , 7 , 10 , 0 , 2 , 5 , 6 , 6 , 12 , 1

The order: 0 , 1 , 2 , 2 , 5 , 6 , 6 , 7 , 10 , 12

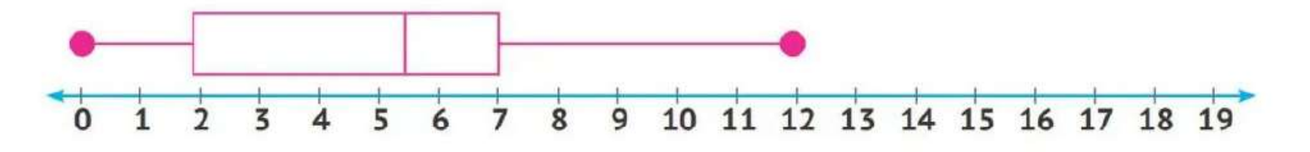
[1] Minimum Value: 0

[2] Lower Quartile: 2

[3] Median: 5.5

[4] Upper Quartile: 7

[5] Maximum Value: 12



b) 4 , 6 , 1 , 2 , 0 , 5 , 4 , 2 , 8 , 9 , 7 , 8 , 3 , 7

The order: 0 , 1 , 2 , 2 , 3 , 4 , 4 , 5 , 6 , 7 , 7 , 8 , 8 , 9

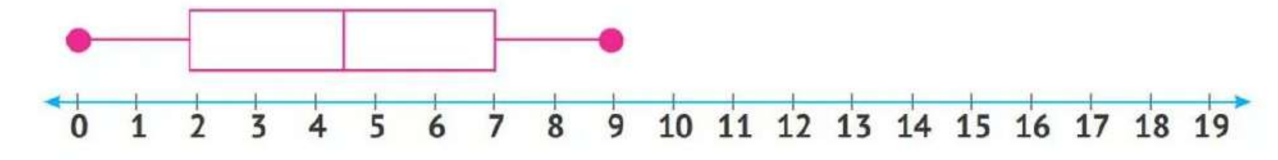
[1] Minimum Value: 0

[2] Lower Quartile: 2

[3] Median: 4.5

[4] Upper Quartile: 7

[5] Maximum Value: 9





10

1 For the set of values: 3 , 11 , 7 , 2 , 3 , 8 , 7, complete:

The order: .... 2 , 3 , 3 , 7 , 7 , 8 , 11 ....

a) Minimum Value: .... 2 ....

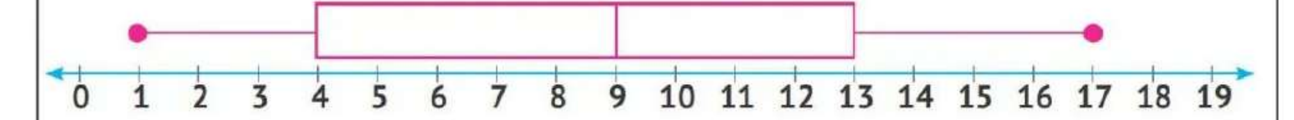
b) Lower Quartile: .... 3 ....

c) Median: .... 7 ....

d) Upper Quartile: .... 8 ....

e) Maximum Value: .... 11 ....

2 Using the following box plot, identify the 5-point summary of the data set:



a) Minimum Value: .... 1 ....

b) Lower Quartile: .... 4 ....

c) Median: .... 9 ....

d) Upper Quartile: .... 13 ....

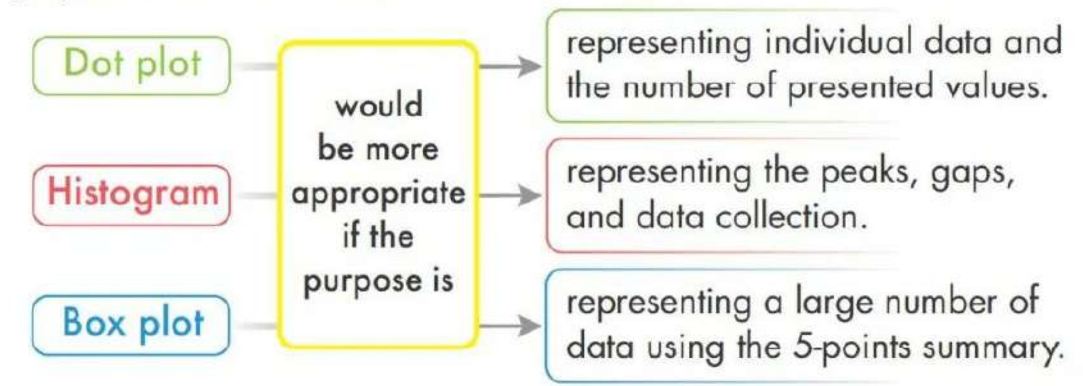
e) Maximum Value: .... 17 ....



Applications on Data Representations

Dot Plot - Histogram - Box Plot

- Each of them is suitable for representing numerical data. To choose the most appropriate graph for a set of data, the purpose of using the graph must be determined.

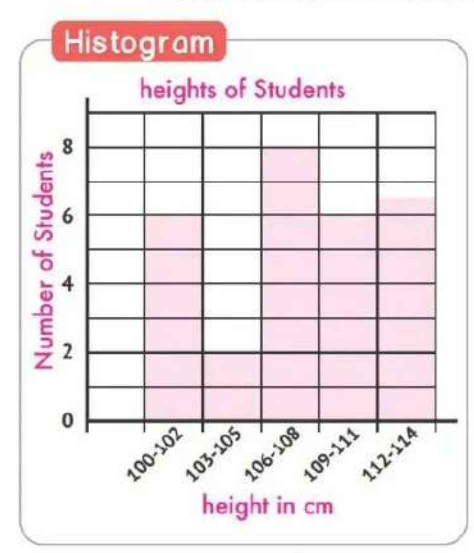


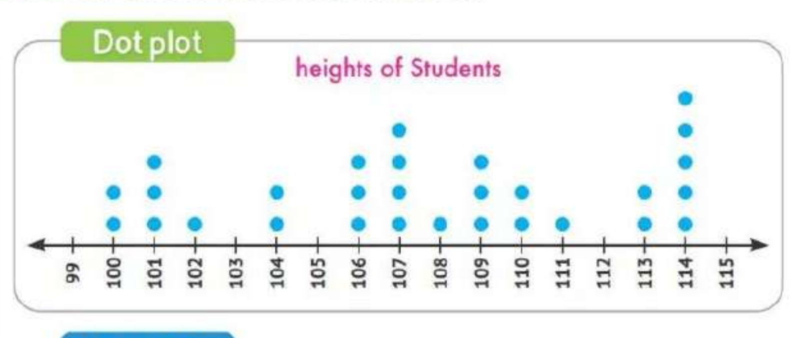
Examples of statistical questions that can be answered using the above representations:

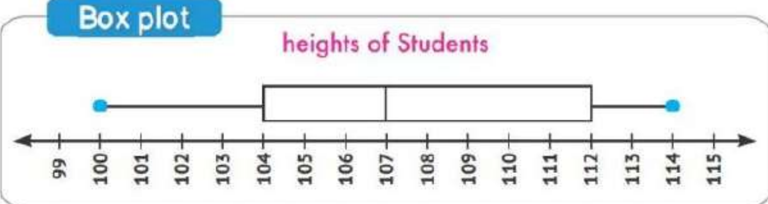
The question is about the	Dot Plot	Histogram	Box Plot
ⓐ Total number of values represented	✓	✓	
ⓑ Number of times each value is repeated	✓		
ⓒ Most frequent value	✓		
ⓓ Least frequent value	✓		
ⓔ Number of repetitions of values in a specified period	✓	✓	
ⓕ Number of repeated values for a set of periods	✓	✓	
ⓖ Gaps	✓	✓	
ⓗ Maximum value	✓		✓
ⓘ Minimum value	✓		✓
ⓙ 5-point summary	✓		✓
ⓚ Median	✓		✓



The following graphs represent the heights of a number of students, rounded to the nearest centimeter.







Dot plot

- It shows the number of students and the height of each student accurately.
- The tallest student is 114 cm tall and the shortest is 100 cm.
- The most frequent height is 114 cm.

Histogram

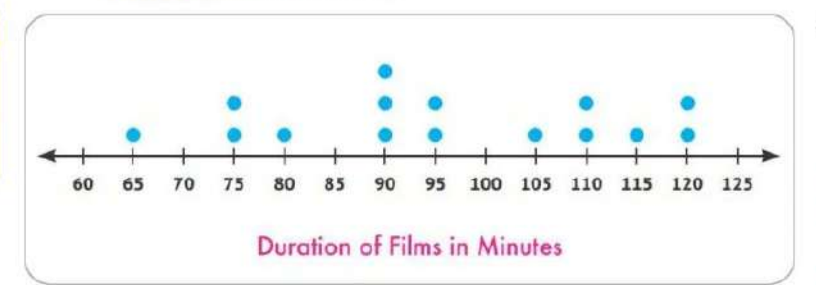
- It shows that the tallest students range in height from 112 cm to 114 cm.
- It shows that the least frequent heights are from 103 cm to 105 cm.
- It shows that the most common heights are from 106 cm to 108 cm.

Box plot

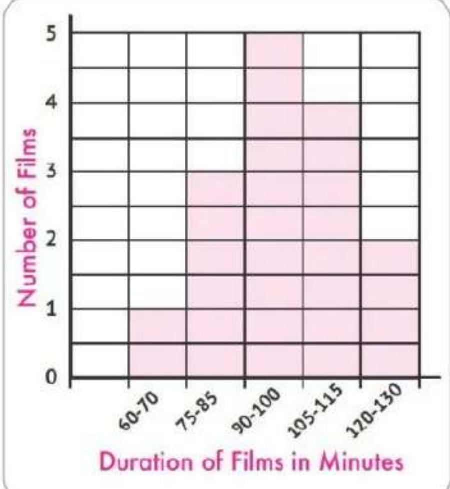
- It shows that the shortest student is 100 cm tall and that the tallest student is 114 cm tall.
- The median is 107, the first quartile is 104, and the second quartile is 112.

Important Note: • There are questions that can only be answered through one of the previous graphs (dot plots), and other questions that can be answered through the other two graphs, and some questions can be answered through the three graphs.

1 The following graphs show the duration of showing a number of films in minutes:







a **Answer the following questions, explaining the graph that helps you with the answer:**

	Question	Answer	Graph		
			Dot Plot	Histogram	Box Plot
1	How many films are their duration graphically represented?	15	✓	✓	✗
2	What is the duration of longest film?	120	✓	✗	✓
3	Exactly how many movies are 100 minutes long?	0	✓	✗	✗
4	How many movies are less than 90 minutes long?	4	✓	✓	✗
5	How many movies are from 105 to 115 minutes long?	4	✓	✓	✗
6	What is the median?	95	✓	✗	✓
7	How long are the most popular films?	90	✓	✗	✗

b **Write one question would be better to answer using:** there are many answer

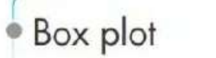
1. Dot plot: • ....
2. Histogram: • ....
3. Box plot: • ....



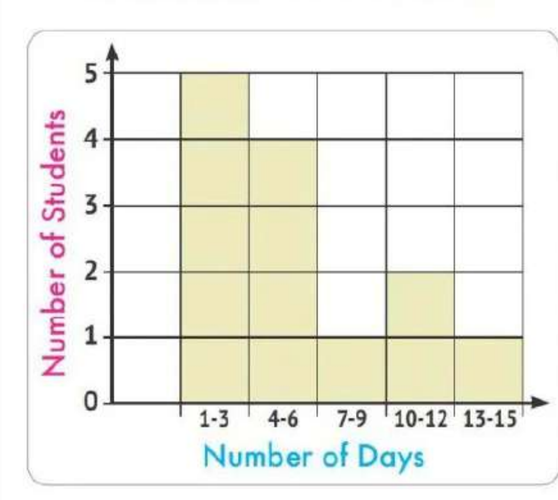
10

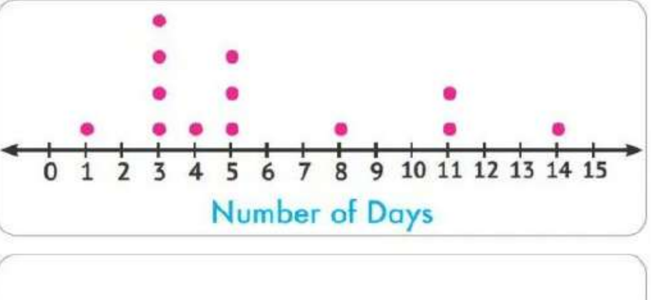
1 Match each statistical question with the best graph that can be used to answer it:

a What is the most frequent value?	③	Histogram 1
b What is the most frequent interval?	①	Box plot 2
c What is the upper quartile?	②	Dot plot 3



2 The following graphs show the number of days in which a group of students were absent:





0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Number of Days

Write two questions would be better to answer using: there are many answer

a Dot plot:

1 .... 2 ....

b Histogram:

1 .... 2 ....

c Box plot:

1 .... 2 ....



Measures of Central Tendency and Spread



Exploring Measures of Central Tendency and Spread

Lessons 1&2 Exploring the Balance of Data Sets Interpreting Arithmetic Mean

Learning Objectives:

By the end of these lessons, the student will be able to:

- Summarize the data in a data set using a single number.
- Explore mean as a fair share.
- Determine an algorithm for calculating the mean of a data set.

Lesson 3 Exploring Median, Mode, and Outliers

Learning Objective:

By the end of this lesson, the student will be able to:

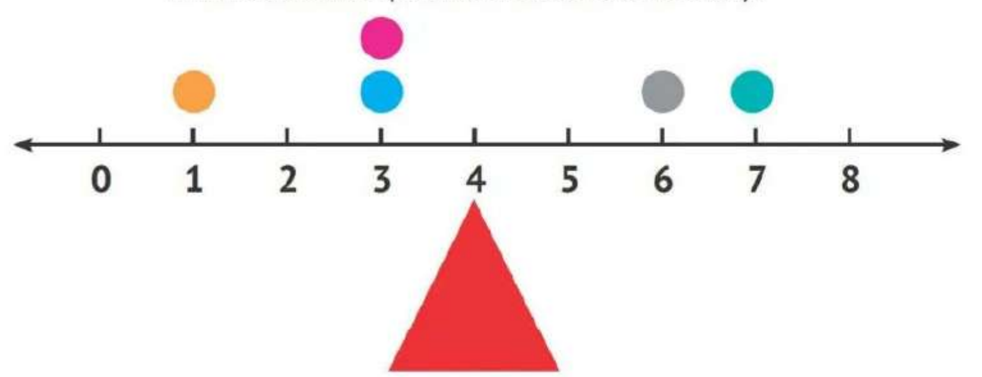
- Determine how outliers and shape of a graph can help to determine whether mean or median is a better measure of center.

Lesson 4 Exploring the Range

Learning Objective:

By the end of this lesson, the student will be able to:

- Defines and calculates the range of data sets to provide an introduction to the importance of measures of variability.





Exploring the Balance of Data Sets
Interpreting Arithmetic Mean

- **Measures of central tendency (center)** are a group of measures that describe a gathering point around central values. General measures of central tendency are the mean, median, and mode.

- **The mean** is a numerical value that represents the average of a set of values.

Ways to Find the Mean of a Set of Numerical Values

First: Finding the Mean by Finding the Balance Point

(The value of the center of a set of data)

- When representing data graphically using a dot plots graph, the mean of a set of data is the value of the balance point of that set of data.

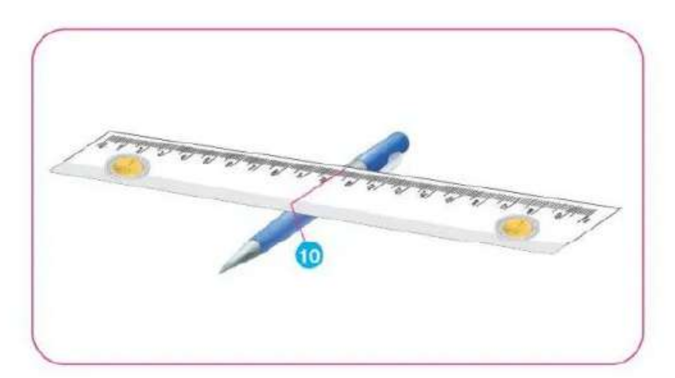
Balance point (the center of a set of data)

- It's a point on a number line or in a data set in numerical order such that the numbers are balanced on both sides.



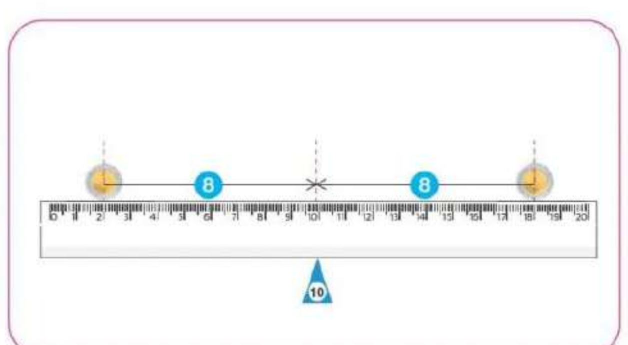
Balance Game

- Bring a ruler (20 cm), some coins, and a pen.
- Put a coin at number (2) and another coin at number (18) on the ruler and move it over the pen until it becomes balanced, as shown in the pictures.



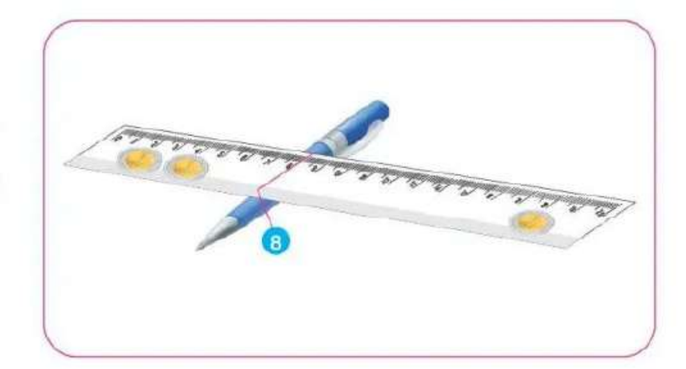
- **Notice** the position of the pen at which the ruler is balanced.

  You find it on number 10, which is the balance point.



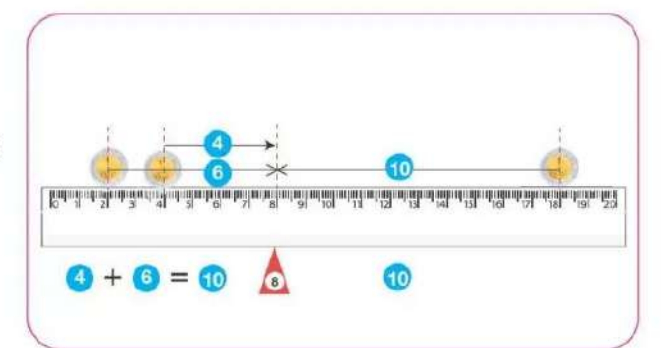
So, the mean of the two numbers 2 and 18 is 10.

- Add another coin at number (4) on the ruler and move it over the pen until it becomes balanced, as shown in the pictures.



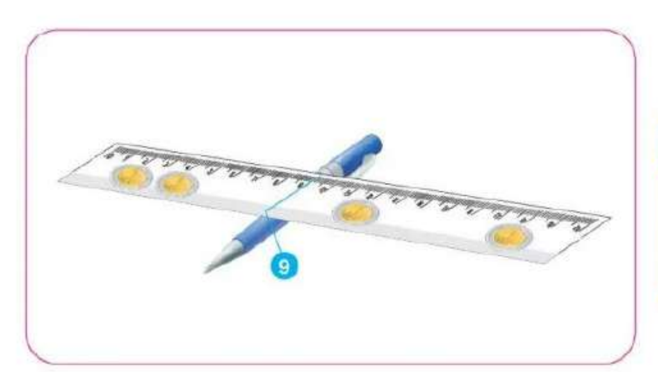
- **Notice** the position of the pen at which the ruler is balanced.

  You find it on number (8), which is the balance point.



The mean of the numbers (2, 4, 18) is 8

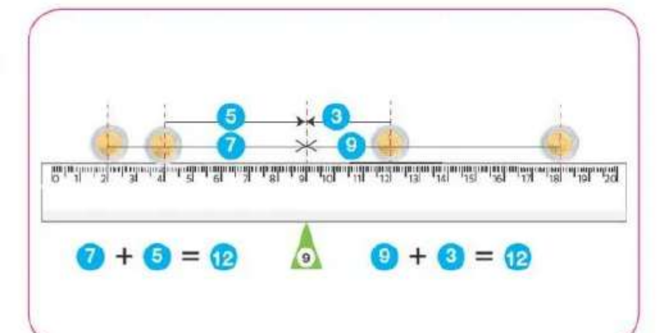
- Add another coin at number (12) on the ruler and move it over the pen until it becomes balanced, as shown in the pictures.



- **Notice** the position of the pen at which the ruler is balanced.

You find it on number (8), which is the balance point.

You also find it on number (10), which is the balance point).



The mean of the numbers 2, 4, 12, 18 is 9.

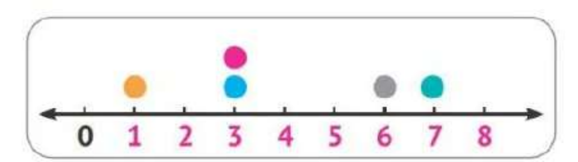
Repeat the game, add more coins, and notice the change in the balance points with the change in the positions of the coins.

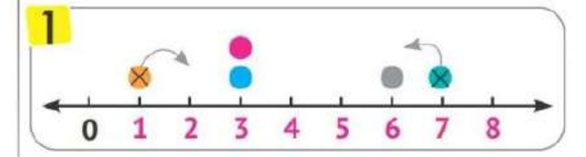


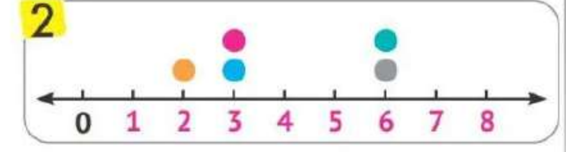
- If we add the distances between the numbers and the mean (the balance point) on each side, each time we find that the sum of these distances is always equal on both sides (balanced).

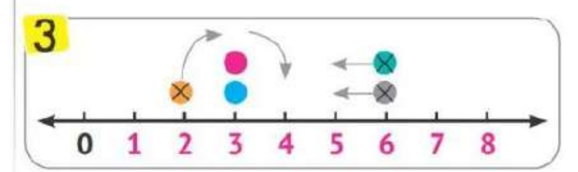


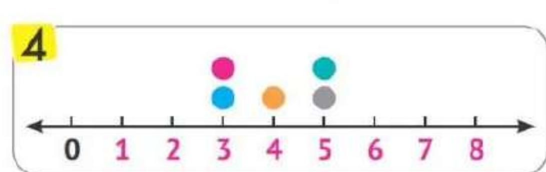
Determine the mean (balance point) for the data represented using the following dot plot:

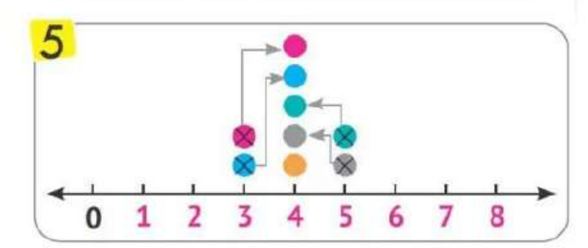








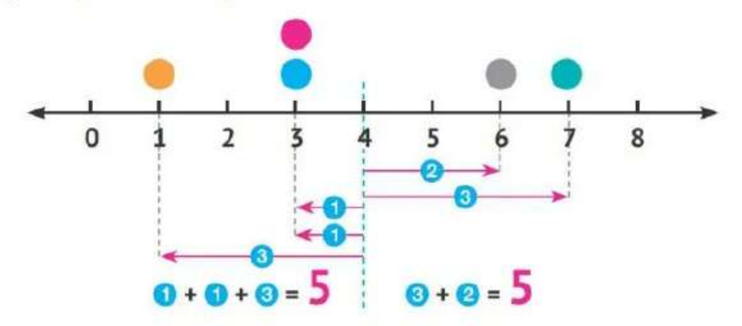




Notice that:

- Moving one point in two steps is equivalent to moving two points in one step.
- The number at which all points congregate is the center of this set of data. The mean is 4.

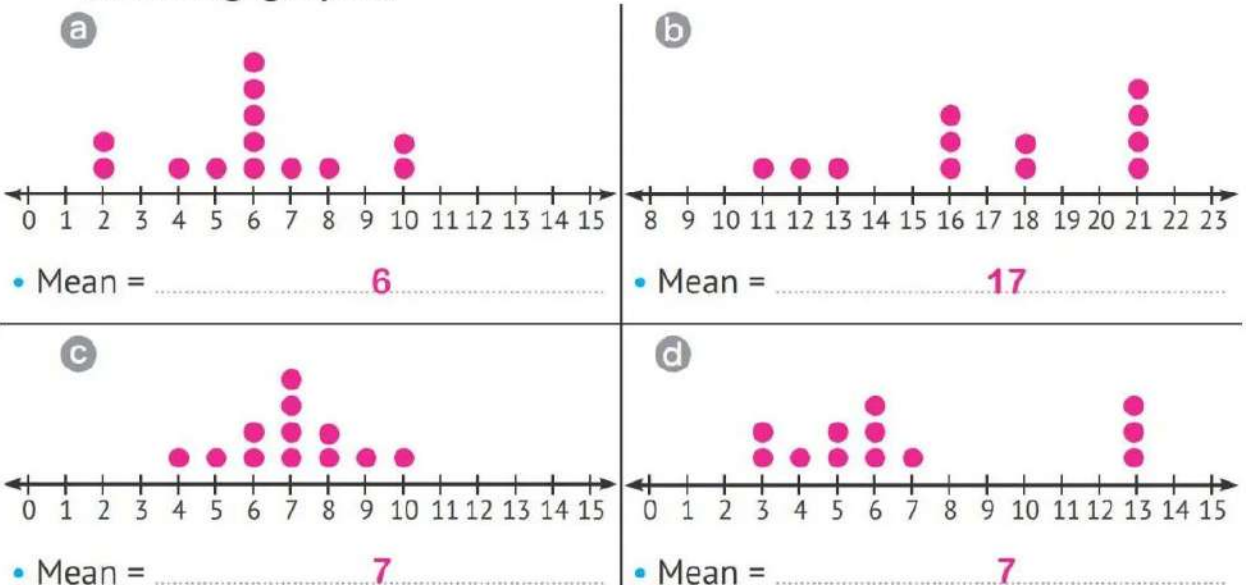
When adding the distances between the points and the mean from both sides, they must be equal (balanced).



From the foregoing, we find that the data center represented by the previous point chart is number 4.

That is, the mean of the numbers 7, 6, 3, 3, 1 is 4.

1 **Determine the mean (the center of the data set) for each of the following graphs:**



- Mean = 6
- Mean = 17

ⓒ

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

- Mean = 7

ⓓ

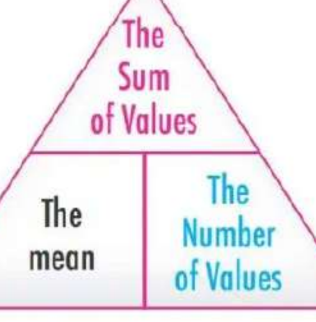
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

- Mean = 7

Second: The Mean Algorithm (the mean as a fair share)

$$\text{The mean} = \frac{\text{The Sum of Values}}{\text{The Number of Values}}$$

The Number of Values X The mean = The Sum of Values



EX. **A group of students each has a number of pens, as shown in the table:**

Student	Mahmoud	Saleh	Hady	Mark	Nader
Number of Pens	6	7	2	3	7

- These students collected their pens together and redistributed them equally among themselves, so each of them had a share of:

$$\frac{6 + 7 + 2 + 3 + 7}{5} = \frac{25}{5} = 5 \text{ Pens}$$



- The redistribution has been made so that each of them has the same share, and this is the mean.

Theme 2

2 **A group of friends collected their marbles and redistributed them equally among themselves. The following table shows the number of marbles that each of them owns.**

Child	Sajid	Marwan	Fatima	Farida	Wafaa	Omar
Number of Marbles	8	9	12	7	3	9

Find the **share** of each of them after redistributing the marbles equally.

$$\text{Mean} = \frac{8+9+12+7+3+9}{6} = 8$$

Ex. **Find the mean of the following values: (4, 11, 16, 20)**

$$\text{Mean: } \frac{4+11+16+20}{4} = \frac{51}{4} = 12\frac{3}{4}$$

3 **Find the mean for the following values:**

ⓐ 40, 38, 36, 34, 32

$$\text{Mean} = \frac{40+38+36+34+32}{5} = 36$$

ⓑ 25, 12, 3, 18

$$\text{Mean} = \frac{25+12+3+18}{4} = 14.5$$

ⓒ 3, 3, 5, 7, 2, 4, 7, 3

$$\text{Mean} = \frac{3+3+5+7+2+4+7+3}{8} = 4.25$$

ⓓ 52, 98, 60

$$\text{Mean} = \frac{52+98+60}{3} = 70$$

Ex.

If the mean of the values: 6, 7, x, 3 is 5, find the value of x.

Solution The mean x The number of values = The sum of the values

$6 + 7 + x + 3 = 4 \times 5$

$x + 16 = 20 \longrightarrow \boxed{x = 4}$

Another Solution

Value of x = (The number of values X The mean) – The sum of given values

$= (4 \times 5) - 16$

$= 20 - 16 = 4$

4 **Find the value of x in each of the following:**

a) If the mean of the values 6, x, 7, 9, 7, 8 is 7.

$x = (6 \times 7) - 37$

$= 42 - 37 = 5$

b) If the mean of the values x, 5, 4, 9, 8 is 6.

$x = (6 \times 5) - 26$

$= 30 - 26 = 4$



$\frac{\quad}{10}$

1 **Choose the correct answer:**

a) The mean of the values: 45, 15, 40, 70, 80 is ....

(40 or 45 or **50** or 60)

b) If the mean of the values 12, 15, x, 8 is 10, then the value of x is ....

(40 or **5** or 20 or 10)

c) If the sum of 8 values equals 48, then the mean of these values is ....

(40 or 56 or 24 or **6**)

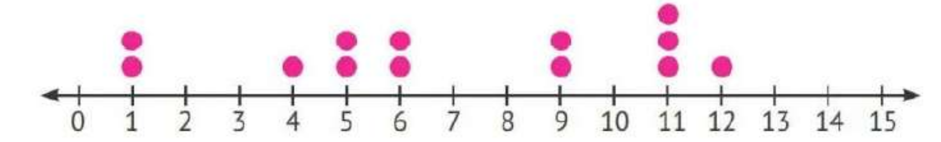
d) If the sum of a set of values is 36, and the mean of these values is 6, then the number of these values is .... (**6** or 42 or 30 or 216)

e) If the mean of 9 values is 5, then the sum of these values is ....

(**45** or 14 or 4 or 95)

2 **Determine the mean for the following graph:**

Mean: ......7......





Exploring Median, Mode, and Outliers

The Mode

- The mode of a set of data is the most common (frequent) value in the set.

Some values might have

Only one mode

Ex.
- The values (5, 8, 5, 5, 6, 8, 5) have one mode, which is 5.

Because only 5 is the most frequent number.

More than one mode

Ex.
- The values (6, 5, 8, 6, 5, 7, 5, 6) have two modes, which are 5 and 6.

Because each of 5 and 6 are the most frequent numbers.

No mode

Ex.
- The values (8, 3, 9, 5, 4, 2, 10, 0) do not have a mode.

Because no value is repeated more than the others.



- The mode can be found for a set of categorical data.

Ex. The mode of the values (red, green, yellow, red, blue) is red

1 **Find the mode for each of the following set of values:**

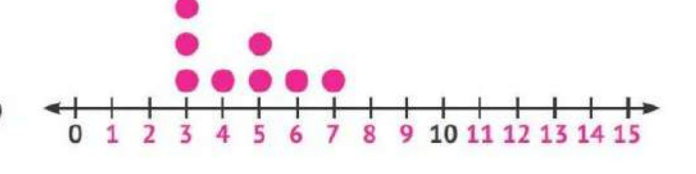
	Values	Mode
a	6, 8, 3, 8, 5, 8, 3	8
b	7, 1, 2, 7, 6, 4, 3, 5	7
c	Car, plane, bus, bike, plane	plane
d	2, 3, 2, 7, 8, 2	2
e	Orange, banana, grape, tangerine, guava	none
f	12, 15, 12, 10, 6, 7	12
g	10, 13, 10, 13, 7, 2	10 , 13

Outliers

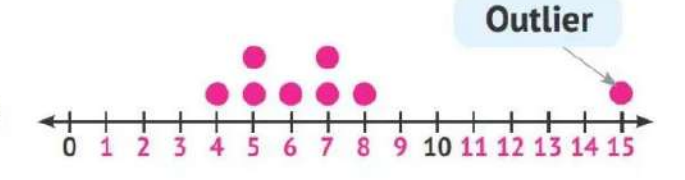
- An outlier is an extreme value (high or low) that differs from most other values.

Ex.

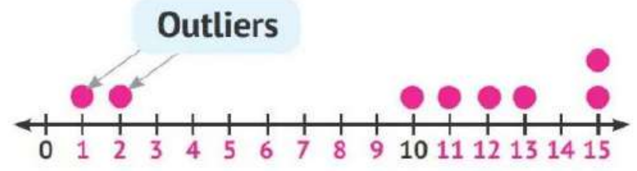
ⓐ
- Values: "6, 3, 7, 5, 3, 5, 4, 3"
- There are **no** outliers.
- Because all values are close to each other.



ⓑ
- Values: "7, 6, 5, 8, 7, 4, 15, 5"
- "15" is called an **outlier**.
- Because it is much higher than the other values.



ⓒ
- Values: "12, 15, 2, 1, 10, 15, 13, 11"
- "1 and 2" are called **outliers**.
- Because they are less than the other values.



2 **List the outliers in each of the following sets of values:**

	Values	Outliers
ⓐ	6, 8, 7, 5, 19	19
ⓑ	16, 17, 15, 18, 2	2
ⓒ	3, 2, 5, 6, 4, 5	non
ⓓ	24, 25, 3, 2, 27, 22	2 , 3
ⓔ	122, 118, 120, 119, 124	non
ⓕ	55, 65, 58, 11, 69	11

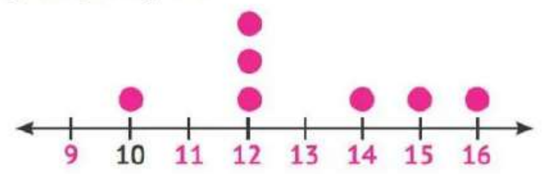
Mean, median, and outliers

Note the following examples to see the effect of outliers when calculating the mean and median of a set of values.

Ex. **Set of values: "10, 12, 12, 15, 12, 16, 14"**

The mean is 13

and the median is 12.



In the previous example

- If the value 16 is replaced by another value, such as 56, then the set of values becomes: "10, 12, 12, 15, 12, 58, 14".

So, **the mean: 19 and the median: 12**

- If the value 10 is replaced by another value, such as 3, then the set of values becomes: "3, 12, 12, 15, 12, 16, 14".

So, **the mean: 12 and the median: 12**



The mean **is affected by** outliers in the data set.

The mean
- increases if the outliers are greater than the other values.
- decreases if the outliers are less than the other values.

The median **is not affected by** outliers in the data set.

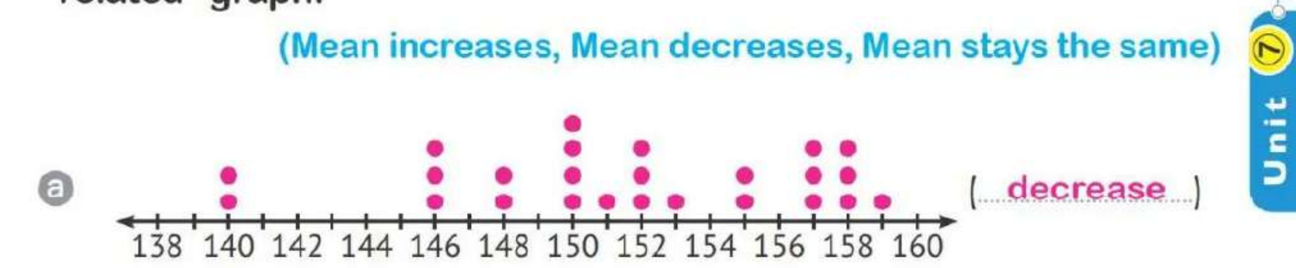
It is preferable to use:

- The median as a measure of the central tendency if the data has outliers at one side only.
- The mean as a measure of the central tendency if the data does not have outliers.

3 **Use reasoning to assign each of the given descriptions to the related graph:**

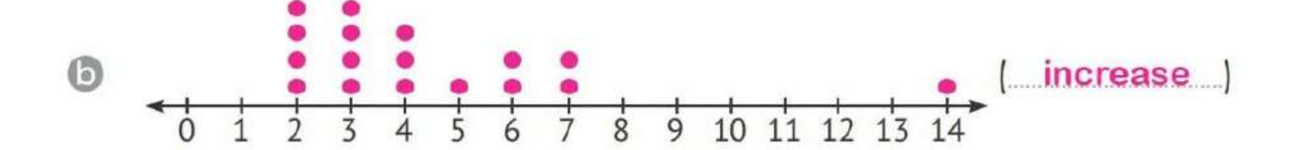
(Mean increases, Mean decreases, Mean stays the same)

ⓐ



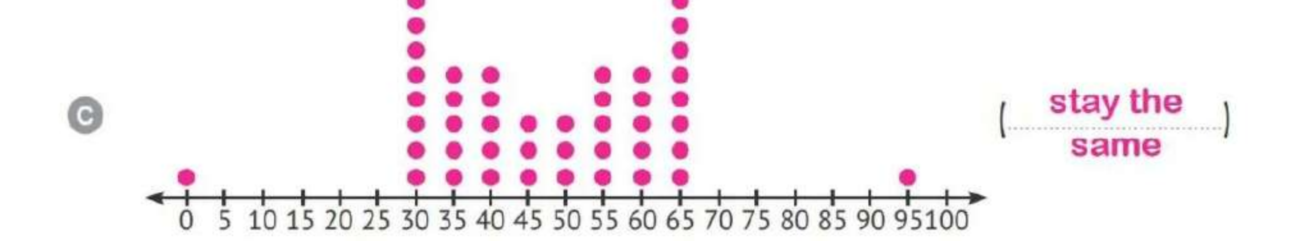
(......decrease......)

ⓑ



(......increase......)

ⓒ



(......stay the same......)

When representing data graphically using a dot plot:

If the graph is

- skewed to one side, the median is the best choice as a measure of central tendency.

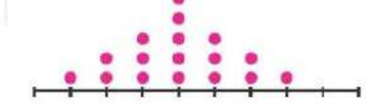
Ex.

- evenly distributed, the mean is the best choice as a measure of central tendency.

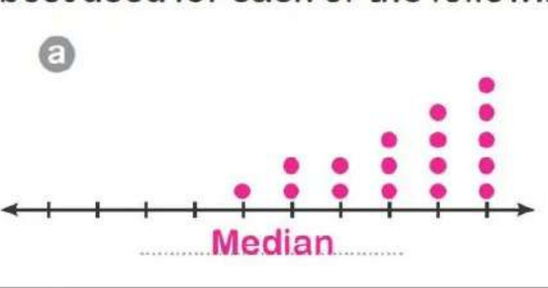
Ex.

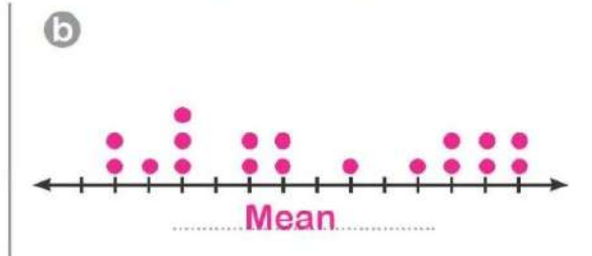
- symmetrical, then either the mean or the median are suitable as measures of central tendency.

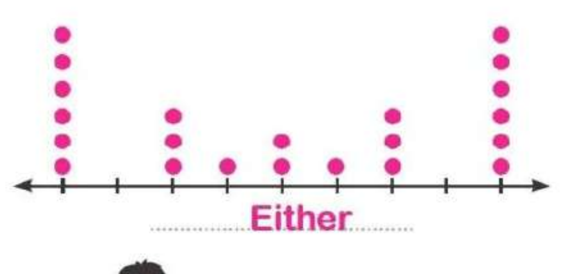
Ex.



4 Choose the measure of central tendency that you think would be best used for each of the following graphs, (Mean, Median or Either):

a

Median

b

Mean

c

Either

Quiz

10

1 Choose the correct answer for the values (2, 6, 7, 23, 2, 1, 8):

a The mode: 2 (6 or 7 or 2 or 23)

b The median: 6 (6 or 7 or 2 or 23)

c The mean: 7 (6 or 7 or 2 or 23)

d The outlier: 23 (6 or 7 or 2 or 23)

2 Using the following dot plot, complete:

a The mode: 6

b The median: 4

c The mean: 4

d The outlier: 11



e The measure of center that you think would be best used for this graph is Median . (mean or median)



Exploring the Range

- **Measure of variability:** it's a single value that indicates the spread of data in a set.

- **The range** of the data is the amount of spread among all the data collected.

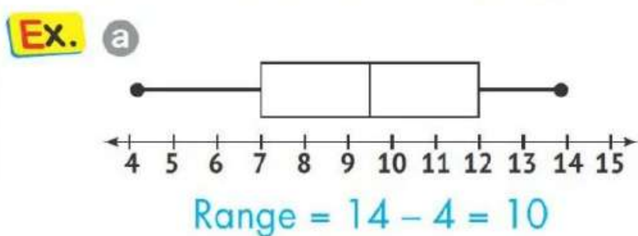
The Range = The Maximum Value – The Minimum Value

Ex. The range for the set of values "6, 3, 7, 2, 9, 5" is $9 - 2 = 7$.



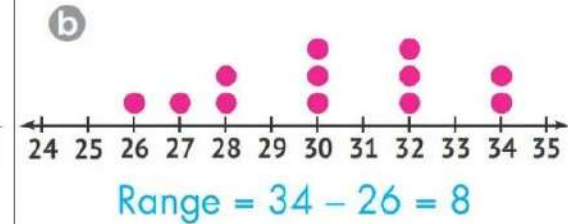
- **It is easier to find the range using a dot plot or box plot.**
  Because each of them shows the greatest value and the least value.

Ex. (a)



Range = 14 – 4 = 10

(b)



Range = 34 – 26 = 8

- **The histogram** does not show individual data points, and the data is aggregated into intervals. Therefore, the range cannot be found using a histogram.
- **The tables** can be trickier because the values are not ordered from smallest to largest.

Ex. **The following table shows Nour's scores in quizzes. What is the range score for her quizzes?**

Quiz	1	2	3	4	5	6	7	8
Scores	18	15	17	20	18	19	18	15

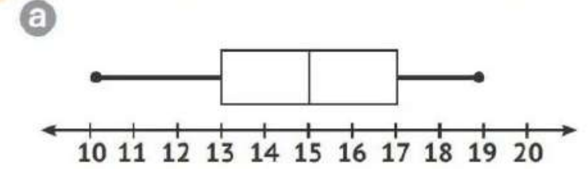
- **Lowest score:** 15
- **Highest score:** 20
- **The range:** 20 – 15 = 5

1 Find the range for each of the following set of values:

	Values	Range
a	6, 3, 5, 9, 2, 2	9 – 2 = 7
b	25, 36, 75, 15, 36, 14	75 – 14 = 61
c	9, 25, 78, 6, 14	78 – 6 = 72
d	5, 2, 7, 13, 9, 12	13 – 2 = 11
e	55, 40, 12, 11, 45	55 – 11 = 44

2 Use each of the following graphs to find the range:

a

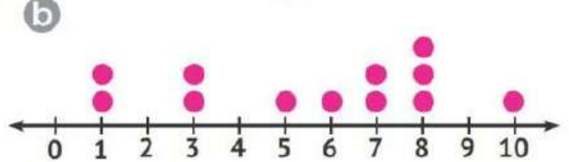


Largest value: 19

Least value: 10

Range: 19 – 10 = 9

b

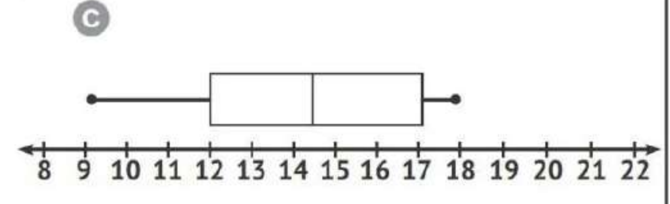


Largest value: 10

Least value: 1

Range: 10 – 1 = 9

c

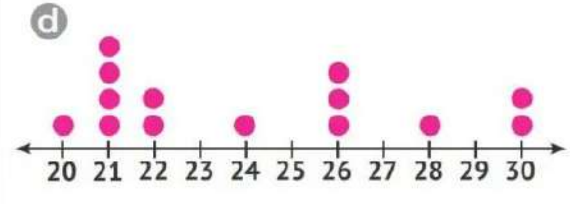


Largest value: 18

Least value: 9

Range: 18 – 9 = 9

d



Largest value: 30

Least value: 20

Range: 30 – 20 = 10

3 Find the range in each of the following:

a The following table represents the temperatures recorded in one of the cities in a week.

Day	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature	25°	28°	30°	22°	24°	26°	25°

- Largest value: 30
- Least value: 20
- Range: 30 – 20 = 10

ⓑ The following table represents the number of hours Hatem spent studying for 5 days:

Day	First	Second	Third	Fourth	Fifth
Number of Hours	4	5	6	3	5

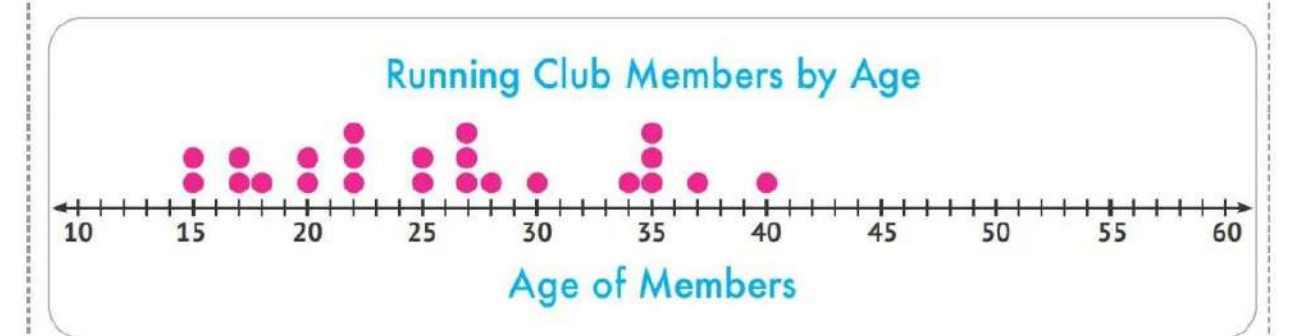
- Largest value: 6
- Least value: 3
- Range 6 – 3 = 3

Outliers and Range

The range **is affected by** outliers in the data set.

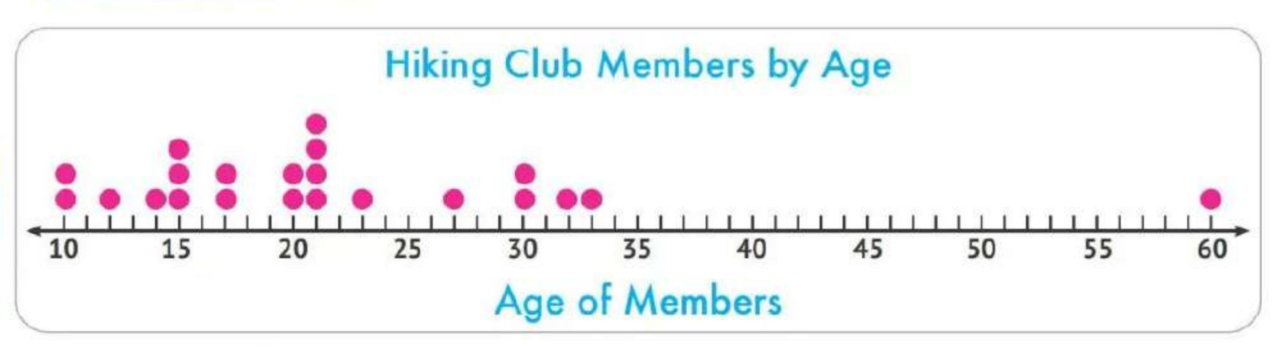
- Therefore, it is useful to know the measures of dispersion (**range**) in addition to the measures of the central tendency (**median**) when analyzing data in which there are outliers.

Ex. **This is the comparison of the two dot plots showing the ages of members in a running club versus the members of a hiking club:**



- **Range:** 40 – 15 = 25
- **Median:** 25

- **Note that** the range accurately describes the data and that the age range is 25.



- **Range:** 60 - 10 = 50
- **Median:** 20.5
- An outlier results in a larger range, but the majority of members have a shorter life span if the outlier is excluded.

> So the range is a good measure for the data when there are no outliers.



10

1 Choose the correct answer for the values (12, 16, 2, 15, 12, 14, 13):

- ⓐ The range: .... (12 or 2 or 13 or **14**)
- ⓑ The mode: .... (**12** or 2 or 13 or 14)
- ⓒ The median: .... (12 or 2 or **13** or 14)
- ⓓ The mean: .... (**12** or 2 or 13 or 14)
- ⓔ The outlier: .... (12 or **2** or 13 or 14)

2 Use the opposite box plot to complete:

- ⓐ The range: 8 – 0 = 8
- ⓑ The median: 6
- ⓒ The outlier: 0

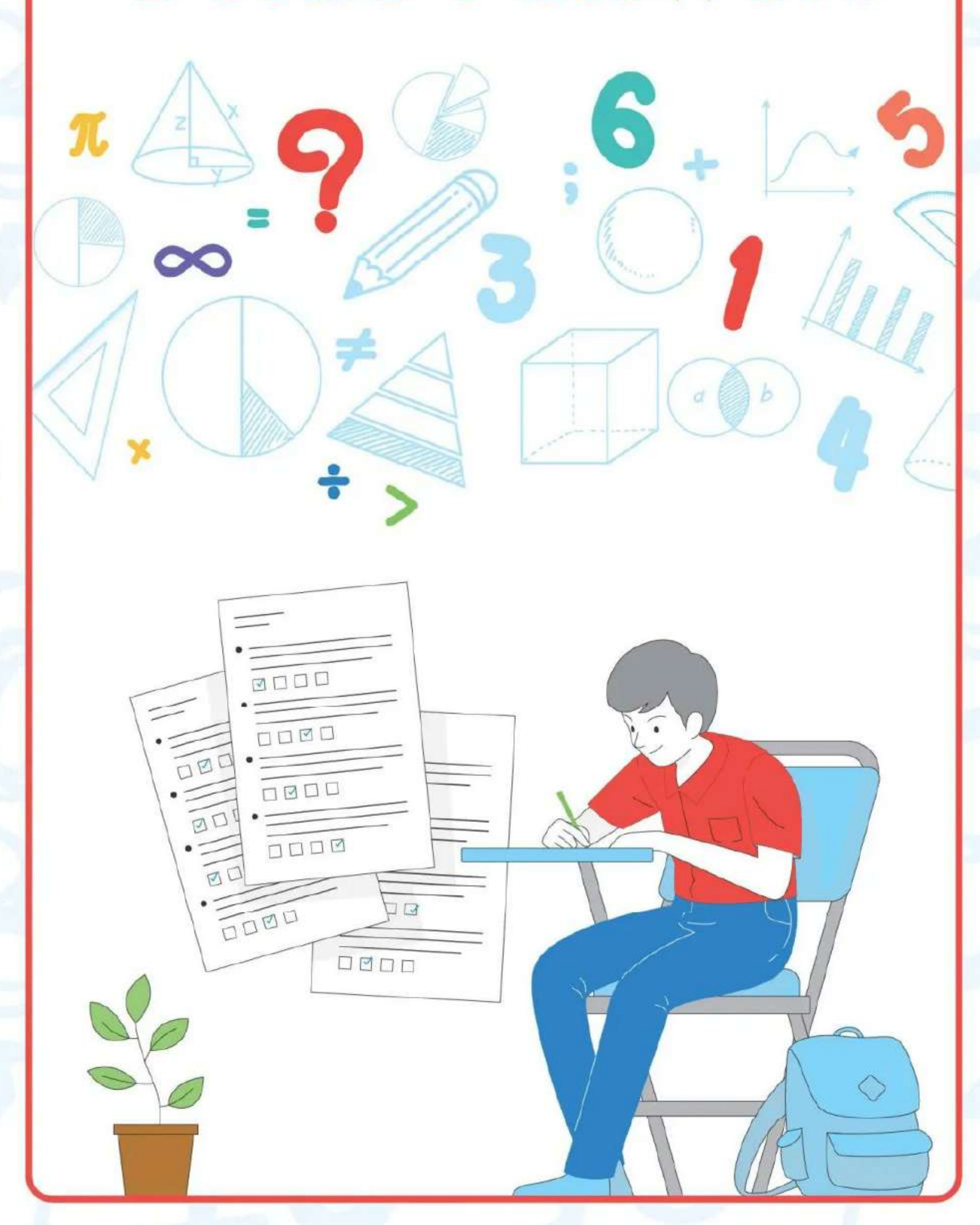
0 1 2 3 4 5 6 7 8

3 Use the opposite dot plot to complete:

- ⓐ The range: 8 – 1 = 7
- ⓑ The median: 4

0 1 2 3 4 5 6 7 8

Guide Answers



Theme 1

Unit 1

Lesson 1

1.
   a. 8 , 4 , not divisible
   b. 8 , 3 , not divisible
   c. 4 , 0 , divisible
   d. 30 , 0 , divisible
   e. 5 , 4 , not divisible
   f. 3 , 0 , divisible
2. 30 , 54 , 258 , 212 , 654 , 26 , 368 , 6,530
3. 45 , 36 , 456 1,002 , 558 , 10,002
4. 45 , 250 , 830 , 945 , 630 , 2005
5.
   a. 342 , 250 , 702 , 600
   b. 342 , 531 , 315 , 702 , 600
   c. 335 , 250 , 315 , 600
   d. 342 , 702 , 600
   e. 250 , 600
6.
   a. ✓ , ✗ , ✓ , ✗ , ✗ , ✗
   b. ✓ , ✓ , ✓ , ✗ , ✓ , ✗
   c. ✓ , ✓ , ✗ , ✓ , ✓ , ✓
   d. ✓ , ✓ , ✗ , ✗ , ✓ , ✗
   e. ✓ , ✗ , ✗ , ✓ , ✗ , ✓
   f. ✓ , ✓ , ✓ , ✓ , ✓ , ✓
   g. ✓ , ✓ , ✓ , ✗ , ✓ , ✗

Quiz

1. a. 1,026 b. 6,900 c. 836
2. a. zero b. 0 , 5 c. 6
   d. 12
   e. 15 , 30 , 45 (many answers accepted)

Lesson 2

1.
   a. 16 = 2 x 2 x 2 x 2
   b. 20 = 2 x 2 x 5
   c. 36 = 2 x 2 x 3 x 3
   d. 48 = 2 x 2 x 2 x 2 x 3
2.
   a. 16 = 2 x 2 x 2 x 2 , 20 = 2 x 2 x 5
      GCF = 2 x 2 = 4
      LCM = 2 x 2 x 2 x 2 x 5 = 80
   b. 24 = 2 x 2 x 2 x 3 , 36 = 2 x 2 x 3 x 3
      GCF = 2 x 2 x 3 = 12
      LCM = 2 x 2 x 2 x 3 x 3 = 72
   c. 16 = 2 x 2 x 2 x 2 , 15 = 3 x 5
      GCF = 1
      LCM = 2 x 2 x 2 x 2 x 3 x 5 = 240
3.
   a. 9 = 3 x 3
      8 = 2 x 2 x 2
      GCF = 1 LCM = 72 (Yes)
   b. 15 = 3 x 5 4 = 2 x 2
      GCF = 1 LCM = 60 (Yes)
   c. 6 = 2 x 3 8 = 2 x 2 x 2
      GCF = 2 LCM = 24 (No)
4.
   a. The two numbers are 30 and 20
   b. common prime factors are 2 , 5
   c. GCF = 10 d. LCM = 60 e. NO

Quiz

1. a. 2 b. their product c. 1
2.
   a. 16 = 2 x 2 x 2 x 2
      24 = 2 x 2 x 2 x 3
      GCF = 2 x 2 x 2 = 8
      LCM = 2 x 2 x 2 x 2 x 3 = 48
   b. [1] 10 and 9 [2] none [3] 1
      [4] 90 [5] yes

Lesson 3

1. a) 5 , 3 , 5 , 6 b) 7 , 2 , 4
   c) 9 , 2 , 8 , 8 d) 9 , 4 , 6
2. a) 6 b) 30 ÷ 6 = 5
   c) 48 ÷ 6 = 8
   d) (6 x 5) + (6 x 8) = 6 x (5 + 8)
3. (8 x 3) + (8 x 2) = 8 x (3 + 2)

Quiz

1. a) 7,5 b) 4,6,2,2
   c) 3 d) 1 e) 6 , 8
2. a) GCF = 3, the greatest number of groups is 3
   b) GCF = 4
   (4 x 3) + (4 x 2) = 4 x (3 + 2)

Lesson 4

1. a) $\frac{9}{12} + \frac{5}{12} = \frac{14}{12} = \frac{7}{6} = 1\frac{1}{6}$
   b) $\frac{7}{9} - \frac{3}{9} = \frac{4}{9}$
   c) $2\frac{9}{24} + 1\frac{20}{24} = 3\frac{29}{24} = 4\frac{5}{24}$
   d) $5\frac{16}{18} - 3\frac{9}{18} = 2\frac{7}{18}$
   e) $8\frac{3}{15} + 2\frac{5}{15} = 10\frac{8}{15}$
   f) $6\frac{8}{12} - 2\frac{3}{12} = 4\frac{5}{12}$
2. a) $2\frac{3}{4} + 1\frac{1}{2} + 1\frac{1}{5}$
   $= 2\frac{15}{20} + 1\frac{10}{20} + 1\frac{4}{20}$
   $= 4\frac{29}{20} = 5\frac{9}{20}$ hours
   b) $5\frac{1}{2} + 3\frac{3}{4} + 2 = 5\frac{2}{4} + 3\frac{3}{4} + 2$
   $= 10\frac{5}{4} = 11\frac{1}{4}$ pounds
   c) $25\frac{1}{2} - 16\frac{1}{4} = 25\frac{2}{4} - 16\frac{1}{4}$
   $= 9\frac{1}{4}$ pounds
   d) $4\frac{1}{2} - 3\frac{1}{4} = 4\frac{2}{4} - 3\frac{1}{4}$
   $= 1\frac{1}{4}$ hours

Quiz

1. a) $5\frac{1}{6} + 3\frac{2}{6} = 8\frac{3}{6} = 8\frac{1}{2}$
   b) $9\frac{2}{4} - 2\frac{1}{4} = 7\frac{1}{4}$
   c) $7\frac{3}{4} - 3\frac{2}{5} = 7\frac{15}{20} - 3\frac{8}{20} = 4\frac{7}{20}$
   d) $7\frac{1}{3} + 3\frac{4}{5} = 7\frac{5}{15} + 3\frac{12}{15} = 10\frac{17}{15}$
   $= 11\frac{2}{15}$
2. a) The total mass $= 3\frac{1}{2} + 4\frac{1}{4}$
   $= 3\frac{2}{4} + 4\frac{1}{4} = 7\frac{3}{4}$ kg
   b) she has left $= 12 - 3\frac{1}{2} = 11\frac{2}{2} - 3\frac{1}{2}$
   $= 8\frac{1}{2}$ meters

Unit 2

Lessons 1&2

1. a) 25 b) -3 c) -10
   d) 12 e) -19 f) -4
2. answer by your self
3. a) -2 b) 5 c) -8
   d) 8 e) -10 f) 1
   g) -1 h) 0
4. a) < b) > c) <
   d) > e) > f) >
   g) > h) = i) =
5. a) 7 b) -6 c) 15
   d) -12 e) 0 f) 45

Quiz

1. a) 0 b) -4 c) 3
2. a) -7 b) -4 c) <
3. the order : −6 , −3 , 0 , 3 , 6

Lessons 3&4

1. a) $\frac{75}{100}$ b) $-\frac{45}{1}$ c) $\frac{4}{1}$
   d) $\frac{0}{8}$ e) $\frac{16}{5}$ f) $-\frac{15}{10}$
2. a) does not belong b) belongs
   c) does not belong d) belongs
3. a) not a subset b) subset c) subset
   d) not a subset
4. a) ✓ , ✓ , ✓ , ✓ , Counting
   b) ✗ , ✓ , ✓ , ✓ , Natural
   c) ✗ , ✗ , ✓ , ✓ , Integer
   d) ✗ , ✗ , ✗ , ✓ , Rational
   e) ✗ , ✗ , ✗ , ✗ , None
   f) ✗ , ✗ , ✗ , ✓ , Rational
5. in order from the left: $-7.25 , -5.5 , -2\frac{1}{3} , 2.5 , 4\frac{1}{2} , 7\frac{3}{4}$
6. a) 0.8 b) $\frac{3}{4}$ c) − 2.5
   d) 0 e) −0.6 f) $-3\frac{1}{7}$
7. a) < b) < c) <
   d) < e) < f) <
   g) = h) > i) <
   j) <
8. a) [1] Ascending: $-4 , 0.6 , 2\frac{3}{7} , 3\frac{5}{9} , 5\frac{3}{8}$
   [2] Descending $5\frac{3}{8} , 3\frac{5}{9} , 2\frac{3}{7} , 0.6 , -4$
   b) [1] Ascending : $-\frac{1}{4} , -0.2 , \frac{1}{4} , 0.3 , \frac{1}{2}$
   [2] Descending: $\frac{1}{2} , 0.3 , \frac{1}{4} , -0.2 , -\frac{1}{4}$

Quiz

1. a) rational number b) $\frac{8}{9}$
   c) > d) −4 , −6
2. a) −5.9 b) −1
   c) rational d) 0
3. the order : $7.7 , -3\frac{1}{5} , -3.8 , -7 , -7\frac{1}{2}$

Lessons 5&6

1. a) 10 b) 4 c) $\frac{2}{3}$
   d) $\frac{4}{7}$ e) 2.05 f) 12.5
2. a) 9 b) 15 c) −1.2
   d) 11 e) 6 or −6
3. a) < b) > c) >
   d) > e) < f) =
4. the order: $-4 , -3.4 , |0.8| , 2.5 , |-5.3|$
5. a) B b) A c) −4.8

Quiz

1. a) < b) > c) =
   d) >
2. a) 8 b) 5 c) 10
   d) −3
3. The order : $-\frac{1}{3} , |\frac{2}{3}| , |1\frac{1}{3}| , \frac{9}{5}$
4. The order : $\frac{1}{2} , 0.2 , |0.02| , -|2\frac{1}{2}|$

Unit 3

Lessons 1&2

1

Coefficient	Variable
3	m
−5	y
1	a , b
$-\frac{3}{7}$	n
6	x , y , z

2 a numerical b algebraic
c numerical d algebraic
e algebraic

3

Variables	Constants	Coefficients
a , c	7	2 , 4
x	17 , 5	1
y	$22, \frac{1}{5}$	2
q , r , s	–	0.2 , 0.6 , 0.8
–	8	–

4

Number of Terms	Like Terms
3	x , $\frac{3}{8}$ x
4	m , 2m / 3,2
2	16 x , 2 x
4	7 x , 7 x , 2 x

5 a $\frac{1}{6}$ m kg b 7n hours

Quiz

1 a −5 b 5a, 2a c 3
2 a numerical expression or algebraic expression
b numerical expression c a , b
3 a → 3 b → 1 c → 2

Lesson 3

1 a x + 5 b y − 3 c 4a
d 2n e $\frac{m}{2}$ or $\frac{1}{2}$ m
f $\frac{5}{t}$ or 5 ÷ t
2 a 1 x plus 7 2 the sum of x and 7
b 1 x minus 3 2 x decreased by 3
c 1 the product of x and 8
2 8 times x
d 1 x divided by 3 2 third x
3 a 3m + 6 b 3a − 4
c $\frac{1}{2}$y + 7 d 2 (b + 6) e 2b + 6
4 a sum of triple x and 2
b 4 times y minus 6
c third x minus 4
d 6 times the sum of a and 7
e 3 times the difference between s and 2
5 a 3y − 12 b 4c c 14e ÷ 2
d $\frac{d}{15}$

Quiz

1 a x decreased by 2
b the sum of 7 and 5 times a
c double y subtracted from 36
2 a y−3 b 2(x + 7) c x , −
3 a → 4 b → 1 c 2 → 2
d → 3

Lesson 4

1 a 24 +6 = 30 b 13 x 7 = 91
c [1.5 x 20] −15 = 30 − 15 = 15
d 28 ÷ [4 x 3.5] = 28 ÷ 14 = 2
2 a 3 b 7
c 7 x 7 x 7 x 7 d 9 e 8

f 1 g 0 h 1

i 0 j 1 k 0

3 a $2 \times 5 + 9 = 10 + 9 = 19$

b $64 \div 16 \times 5 = 4 \times 5 = 20$

c $20 \times 9 - 52 \times 4 = 20 \times 9 - 25 \times 4$

$= 180 - 100 = 80$

d $102 \times 3.69 = 100 \times 3.69 = 369$

Quiz

1 a 27 b 12 c 24

d 32

e $(32 + 3) \div (8 - 1) = 35 \div 7 = 5$

2 a $4 \times 4 \times 4$ b 2 c >

d 2^4 e 1

Lessons 5-7

1 a 25a pounds b 65b pounds

c 34 x + 5 pounds d 22−3y pounds

2 a $5 \times 0.4 + 2 = 2 + 2 = 4$

b $9 \times 2 - 2^3 = 9 \times 2 - 8 = 18 - 8 = 10$

c $28 \div (5 + 2) + 7 = 28 \div 7 + 7 = 4 + 7 = 11$

d $12 \div (4^2 - 10) = 12 \div (16 - 10) = 12 \div 6 = 2$

e $2^3 \times 3 \div 6 = 8 \times 3 \div 6 = 24 \div 6 = 4$

f $6^2 \div 3 \times (4 - 2) = 62 \div 3 \times 2 = 36 \div 3 \times 2$

$= 12 \times 2 = 24$

3 a 30y + 100

b $30 \times 3 + 100 = 90 + 100 = 190$ pounds

4 answer by your self

Quiz

1 a 9k b 7z c 14

d no

2 a → 2 b → 3 c → 1

3 a 6 b 2 c 6

Unit 4

Lesson 1

1 a $4x = 8, x = 2$ b $x + 5 = 11, x = 6$

c $3x = 12, x = 4$ d $x + 3 = 7, x = 4$

2 a $x + 7 - 7 = 15 - 7, x = 8$

b $a - 6 + 6 = 5 + 6, a = 11$

c $4 + y - 4 = 6 - 4, y = 2$

d $\frac{6m}{6} = \frac{18}{6}, m = 3$

e $\frac{n}{5} \times 5 = 3 \times 5, n = 15$

f $\frac{1}{4} t \times 4 = 2 \times 4, t = 8$

Quiz

1 a $x + 2 - 2 = 11 - 2, x = 9$

b $m - 7 + 7 = 9 + 7, m = 16$

c $5y \div 5 = 45 \div 5, y = 9$

d $\frac{k}{8} \times 8 = 6 \times 8, k = 48$

2 a 18 b 6 c 9

Lessons 2&3

1 b , e

2 b , c , f

3 a $x > 4$ b $x < -3$ c $x \geq -1$

d $x \leq 5$ e $x > 7$ f $x \leq -1$

4 a greater than −5

b less than 1

c less than or equal −2

d greater than or equal 4

5 a $x > -4$ or $x \geq -3$

b $x > 0$ or $x \geq 1$

c $x < 0$ or $x \leq -1$

d $x < 4$ or $x \leq 3$

6 Many answers accepted.

ⓐ 1, 2, 3　ⓑ −1, −2, −3
ⓒ −1, 0, 1　ⓓ −1, −2, −3
ⓔ 5, 6, 7　ⓕ 3, 2, 1

7 ⓐ ✗　ⓑ ✗　ⓒ ✗
ⓓ ✓　ⓔ ✓

8 ⓐ ✗　ⓑ ✓　ⓒ ✗
ⓓ ✓　ⓔ ✗

Quiz

1 ⓐ all values greater than −5
ⓑ all values less than or equal 2

2 ⓐ $x > 0$ or $x \geq 1$　ⓑ $x \leq 6$ or $x < 7$
ⓒ $x \geq -3$ or $x > -4$

3 ⓐ $x > 2$　ⓑ $x > -1$　ⓒ 1

Theme 2

Unit 5

Lessons 1&2

1 ⓐ The number of study hours , the exam result
ⓑ level of education , The job
ⓒ The distance traveled , fuel consumption:
ⓓ The number of chocolate bars: , The amount paid

2 Independent: x, m, s, t　Dependent: Y, z, a, f

3 ⓐ $y = x + 6$　ⓑ x (Sameh)
ⓒ y (Ahmed)
ⓓ $y = 12 + 6 = 18$ years

4 $y = 3x$, $y = 4x$, $y = 6x$, $y = 8x$
$3 \times 8 = 24$, $4 \times 8 = 32$, $6 \times 8 = 48$, $8 \times 8 = 64$

Quiz

1 ⓐ x , y
ⓑ The amount of electricity consumption / the value of the electricity bill
ⓒ The number of points he gets/ the number of times he hits the target

2 ⓐ $y = 100x$
ⓑ The number of months "x"
ⓒ The total money she saved "y"
ⓓ $y = 6 \times 100 = 600$ pounds

Lesson 3

1 ⓐ multiply by 8　ⓑ $y = x + 9$
ⓒ $y = \frac{x}{3}$　ⓓ multiply by 3 then add 7
ⓔ subtract 3 then divide the result by 2

2 ⓐ 12, 12 , add 2 , $y = x + 2$
ⓑ 5 , 14 , subtract 5 , $y = x - 5$
ⓒ 12 , 5 , divide by 3 , $y = \frac{x}{3}$
ⓓ 20 , 6 , multiply by 4 , $y = 4 \times p$

3 ⓐ 13 , multiply by 3 the subtract 2 , $y = 3x - 2$
ⓑ 18 , divide by 3 then subtract 1 , $y = x \div 3 - 1$
ⓒ 5 , add 1 then multiply the sum by 2 , $y = (x + 1) \times 2$
ⓓ 2 , subtract 1 then divide the result by 2 , $y = (x - 1) \div 2$

4 ⓐ $y = 2x$, $y = 2 \times 2.3 = 4.6$
ⓑ $y = x + 6$, $y = \frac{1}{5} + 6 = 6\frac{1}{5}$
ⓒ $y = 3x + 4$, $y = 3 \times 5 + 4 = 19$

Quiz

1 a $y = x + 8$ b $y = 3.2 - x$ c 35

2 a $y = 4x$ b $y = 2x + 5$ c 7

3 5 , 25 add 1 then multiply the result by 5,

$y = (x + 1) \times 5$

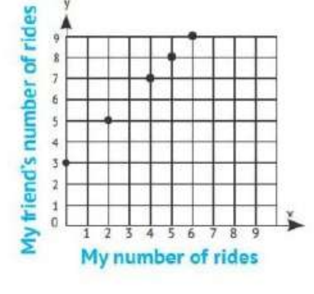
Lesson 4

1 The table:

3 , 5 , 7 , 8 , 9

The equation is

$y = x + 3$



Points: (0, 3) – (2, 5) – (4, 7) – (5, 8) – (6, 9)

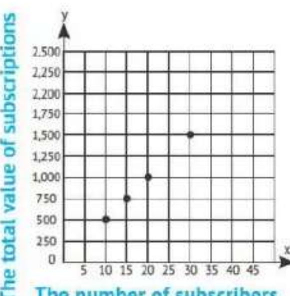
2 The table:

500 , 750 , 1000 , 1500

The equation is

$y = 50x$

Points: (10, 500) – (15, 750) – (20, 1000) – (30, 1500)



Quiz

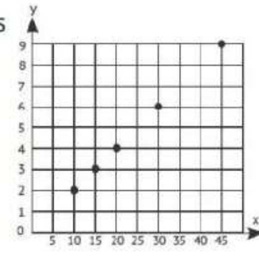
1 a x-axis b y-axis

c Horizontal

d y-axis

2 2, 3, 4, 6, 9

Points: (10, 2) – (15, 3) – (20, 4) – (30, 6) – (45, 9)



Unit 6

Lesson 1

1 a Statistical b Statistical
c Non-Statistical
d Statistical e Non-Statistical
f Non-Statistical
g Statistical h Non-Statistical

2 a Numerical b Categorical
c Categorical d Categorical
e Numerical f Categorical
g Numerical h Numerical

Quiz

1 a Statistical , Non-Statistical
b Numerical , Categorical c numbers
d adjectives or words
e Statistical

2 a Favorite colors b Salaries
c lengths d types of pets
e non-statistical

Lessons 2&3

1 a histogram b bar graph c bar graph
d bar graph e histogram f bar graph

2 7 , 4 , 6 , 5 , 10 , graph by yourself.

Quiz

1 a 2 b 3 c 1

2 6 , 6 , 7 , 10 , 2

Lesson 4

1 a The order: 2 , 4 , 5 , 9 , 9 • median 5

ⓑ The order: 0 , 2 , 5 , 7 , 8 , 11

• median (5+7) ÷ 2 = 6

ⓒ The order: 1 , 2 , 3 , 3 , 6 , 8 , 9 • median 3

ⓓ The order: 0 , 2 , 5 , 5 , 6 , 7 , 8 , 11

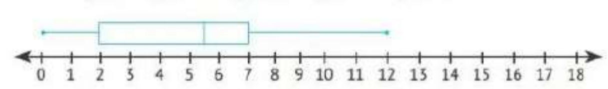
• median (5+6) ÷ 2 = 5.5

2 ⓐ 1 ⓑ 5 ⓒ 8

ⓓ 11 ⓔ 13

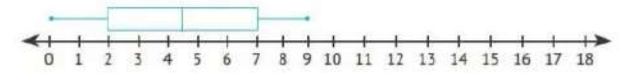
3 ⓐ The order: 0 , 1 , 2 , 2 , 5 , 6 , 6 , 7 , 10 , 12

① 0 ② 2 ③ 5.5 ④ 7 ⑤ 12



ⓑ The order: 0 , 1 , 2 , 2 , 3 , 4 , 4 , 5 , 6 , 7 , 7 , 8 , 8 , 9

① 0 ② 2 ③ 4.5 ④ 7 ⑤ 9



Quiz

1 The order : 2 , 3 , 3 , 7 , 7 , 8 , 11

ⓐ 2 ⓑ 3 ⓒ 7

ⓓ 8 ⓔ 11

2 ⓐ 1 ⓑ 4 ⓒ 9

ⓓ 13 ⓔ 17

Lesson 5

1 ⓐ [1] 15/ ✓ / ✓ / ✗ [2] 120 / ✓ / ✗ / ✓

[3] 0 / ✓ / ✗ / ✗ [4] 4/ ✓ / ✓ / ✗

[5] 4/ ✓ / ✓ / ✗ [6] 95/ ✓/ ✗ / ✓

[7] 90 / ✓ / ✗ / ✗

ⓑ [1] Exactly how many movies are 100 minutes long?

[2] How many films are their duration from 105 to 115 minutes long?

[3] What is the median?

Quiz

1 ⓐ 3 ⓑ 1 ⓒ 2

2 ⓐ [1] How many students were absent for 5 days?

[2] How many students were absent for 2 days?

ⓑ [1] What the what is the most frequency interval?

[2] What the what is the least frequency interval?

ⓒ [1] What id the median?

[2] What is the lower quartile?

Unit 7

Lessons 1&2

1. a) 6 b) 17 c) 7
   d) 7
2. (8 + 9 + 12 + 7 + 3 + 9) ÷ 6 = 8
3. a) (40 + 38 + 36 + 34 + 32) ÷ 5 = 36
   b) (25 + 12 + 3 + 18) ÷ 4 = 14.5
   c) (3 + 3 + 5 + 7 + 2 + 4 + 7 + 3) ÷ 8 = 4.25
   d) (52 + 98 + 60) ÷ 3 = 70
4. a) 7 x 6 = 42 → x +37 = 42 → x = 42 − 37 = 5
   b) sum = 6 x 5 = 30 → x +26 = 30 → x = 30 − 26 = 4

Quiz

1. a) 50 b) 5 c) 6
   d) 6 e) 45
2. 7

Lesson 3

1. a) 8 b) 7 c) plane
   d) 2 e) none f) 12
   g) 10,13
2. a) 19 b) 2 c) non
   d) 2,3 e) none f) 11
3. a) decrease b) increased
   c) stay the same
4. a) Median b) Mean, c) Either

Quiz

1. a) 2 b) 6 c) 7
   d) 23
2. a) 6 b) 4 c) 4
   d) 11 e) Median

Lesson 4

1. a) 7 b) 61 c) 72
   d) 11 e) 44
2. a) 19 , 10 , 9 b) 10 , 1 , 9 c) 18 , 9 , 9
   d) 30 , 20 , 10
3. a) 30 , 22 , 8 b) 6 , 3 , 3

Quiz

1. a) 14 b) 12 c) 13
   d) 12 e) 2
2. a) 8 b) 6 c) 0
3. a) 8−1 = 7 b) 4


PONY
MATH
2024-2025
EXERCISES, FINAL REVISION & EXAMS
6
PRIMARY
FIRST TERM

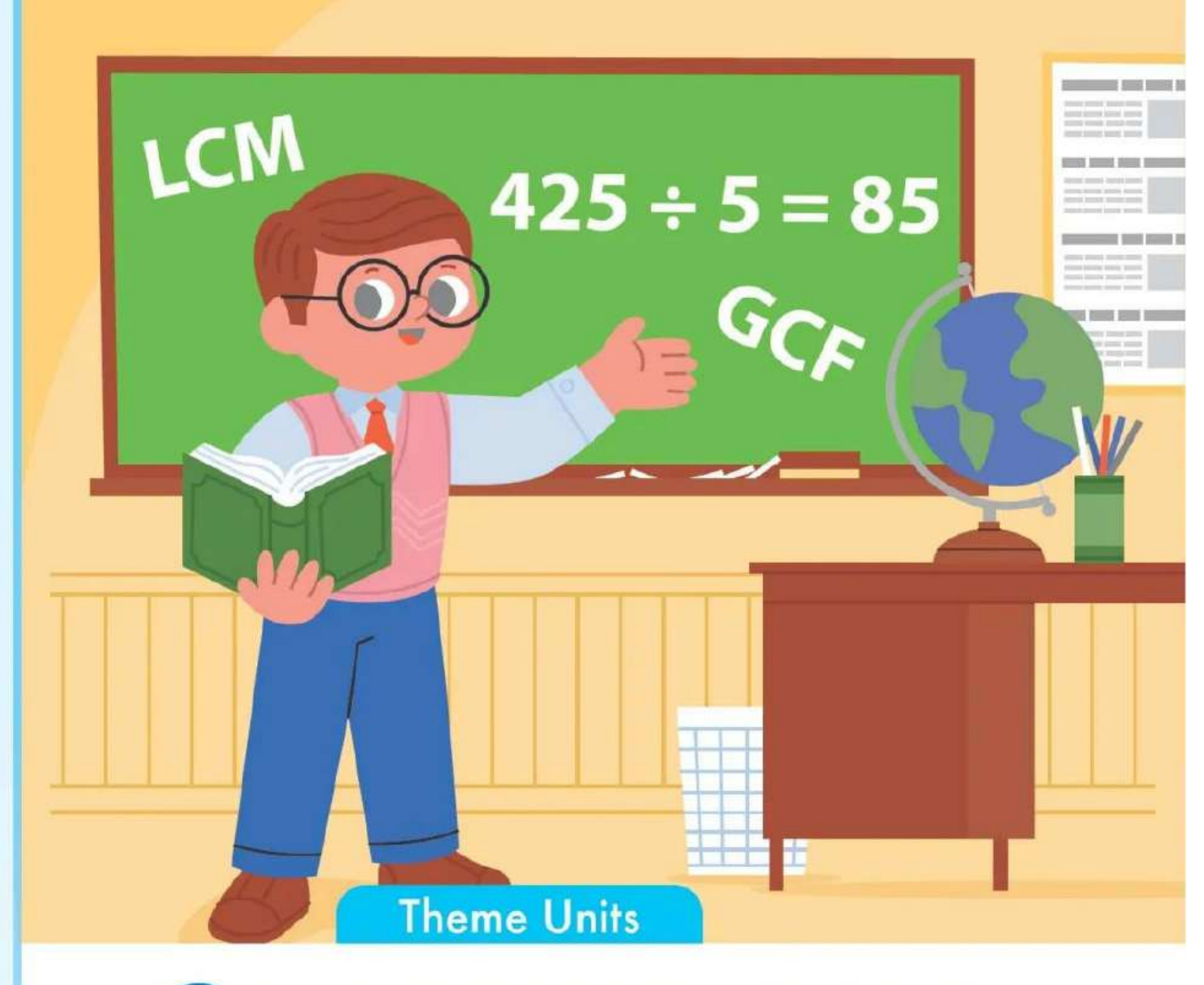


Contents



Theme 1

Numerical Sense and Operations (Expressions and Equations)



Theme Units

Unit 1 Division, Factors, and Multiples

Concept 1.1 Division Algorithm, GCF, and LCM

Lesson 1 Divisibility

1 Complete the following table:

	Division	Quotient	Remainder	Divisible/ Not Divisible
a	45 ÷ 5	9	0	45 is divisible by 5
b	25 ÷ 4	6	1	24 is not divisible by 4
c	60 ÷ 7	8	4	60 is not divisible by 7
d	78 ÷ 6	13	0	78 is divisible by 6
e	35 ÷ 4	8	3	35 is not divisible by 4
f	81 ÷ 9	9	0	81 is divisible by 9
g	28 ÷ 7	4	0	28 is divisible by 7
h	19 ÷ 4	4	3	19 is not divisible by 4
i	120 ÷ 4	30	0	120 is divisible by 4
j	154 ÷ 5	30	4	154 is not divisible by 5
k	245 ÷ 5	49	0	245 is divisible by 5
l	451 ÷ 3	150	1	451 is not divisible by 3
m	102 ÷ 4	25	2	102 is not divisible by 4
n	208 ÷ 2	104	0	208 is divisible by 2

2 Circle the number which is divisible by 2:

30	65	97	54	26
258	216	925	743	250
151	368	654	239	2,544

3 Circle the number which is divisible by 3:

45	36	28	456	558
457	777	891	4,054	3,332
652	100	12,748	445	4,662

4 Circle the number which is divisible by 4:

32	46	82	203	612
440	2,100	2,003	1,054	3,636
32,100	65,002	40,056	63,122	30,008

5 Circle the number which is divisible by 5:

45	36	250	156	558
154	830	940	630	2,005
354	101	12,745	55,551	1,20

6 Use the following numbers to complete:

335 532 711 650 345 762 900

a) The numbers which are divisible by 2: 532 , 650 , 762 , 900

b) The numbers which are divisible by 3: 711 , 345 , 762 , 900

c) The numbers which are divisible by 4: 532 , 900

d) The numbers which are divisible by 5: 335 , 650 , 345 , 900

e) The numbers which are divisible by 6: 762 , 900

f) The numbers which are divisible by 10: 650 , 900

7 Complete the table using (✓) or (✗):

	Number	Divisible by...					
		2	3	4	5	6	10
a	15	✗	✓	✗	✓	✗	✗
b	28	✓	✗	✓	✗	✗	✗
c	30	✓	✓	✗	✓	✓	✓
d	130	✓	✗	✗	✓	✗	✓
e	600	✓	✓	✓	✓	✓	✓
f	102	✓	✓	✗	✗	✓	✗
g	750	✓	✓	✗	✓	✓	✓
h	405	✗	✓	✗	✓	✗	✗
i	2,300	✓	✗	✓	✓	✗	✓
j	4,256	✓	✗	✓	✗	✗	✗

8 Complete the following:

a) Any number is divisible by another, if the remainder of the division operation is ....0.... .

b) $36 \div 5 = 7$ and R1, so 36 is ....not divisible.... by 5.

c) All even numbers are divisible by ....2.... .

d) A number is divisible by 2 if its ones digit is ....0.... , ...2.... , ...4.... , ...6.... or ....8.... .

e) A number is divisible by 3 if the sum of its digits is a multiple of ..3.. .

f) 652 is not divisible by 3 because 6 + 5 + 2 = 13,

and 13 is ......not a multiple...... of 3.

g) A number is divisible by 4 if the Ones and Tens digits of the number are divisible by ......4...... .

h) If the Ones digit of a number is 0 or 5, then the number is divisible by ......5...... .

i) 3 is a factor of 12, so ......12...... is divisible by ......3...... .

j) 24 is a multiple of 4, so ......24...... is divisible by ......4...... .

k) 28 is divisible by 7 because ......28...... is a multiple of ......7...... or ......7...... is factor of ......28...... .

9 Choose the correct answer:

a) 26 is divisible by .... ([2] or 3 or 4 or 6)

b) .... is divisible by 3. (133 or 236 or 304 or [213])

c) If the Ones digit of a number is zero, then it is divisible by ....

(5 only or 2 and 5 only or 5 and 10 only or [2, 5 and 10])

d) The smallest 2-digit number which is divisible by 2 and 3 is ....

(0 or 6 or [12] or 18)

e) The smallest 2-digit number which is divisible by 2 and 5 is ....

(0 or 5 or [10] or 15)

f) The smallest 2-digit number which is divisible by 6 is ....

(0 or 6 or [12] or 18)

g) If 51 divisible by 3, then 51 is a .... of 3. ([multiple] or factor)

h) "35 + ... " is divisible by 3. (0 or [1] or 2 or 3)

Assessment on Lesson 1

Unit 1

1 Complete the following:

(a) 30 is divisible by 6 because 6 x ....5........ = 30.

(b) The number 4,101 is divisible by ....3........ .

(c) All even numbers are divisible by ....2........ .

(d) If 25 is multiple of 5 then, 25 is ....divisible........ by 5.

2 Choose the correct answer:

(a) .... is divisible by 2 and 3. (23 or 81 or [18] or 21)

(b) The number 108 is divisible by the two prime numbers 3 and .... ([2] or 5 or 7 or 11)

(c) All the .... numbers are divisible by 2. (odd or [even] or prime or whole)

(d) .... is the smallest number divisible by each of 2 and 5. (5 or [10] or 15 or 20)

3 Use the numbers 816 , 720 , 4,955 and 1,239 to complete:

(a) The numbers divisible by 2 are ....816 – 720........ .

(b) The numbers divisible by 3 are ....816 – 720 – 1,239........ .

(c) The numbers divisible by 4 are ....816 – 720........ .

(d) The numbers divisible by 5 are ....720 – 4,955........ .

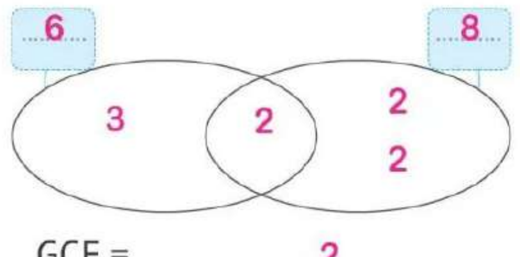
(e) The numbers divisible by 6 are ....816 – 720........ .

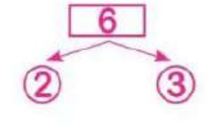
(f) The numbers divisible by 10 are ....720........ .

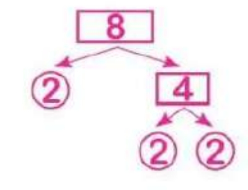
Lesson 2 Factorizing a Number to Its Prime Factors

1 **Find the GCF and LCM using the Venn diagram in each of the following:**

ⓐ 6 and 8







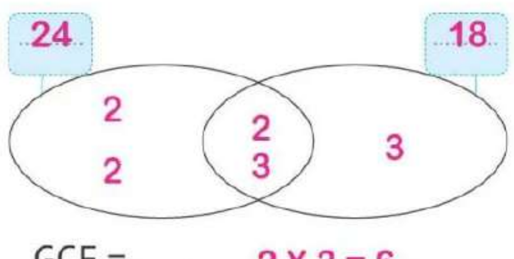
GCF = 2

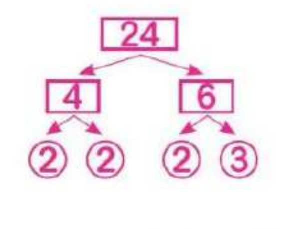
LCM = 2 X 2 X 2 X 3 = 24

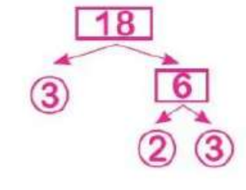
6 = 3 X 2

8 = 2 X 2 X 2

ⓑ 24 and 18







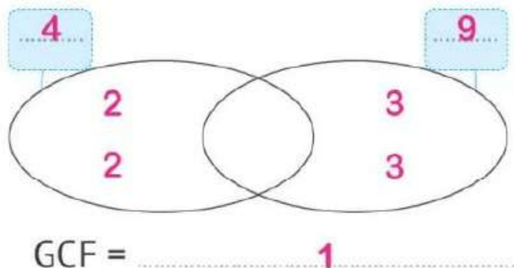
GCF = 2 X 3 = 6

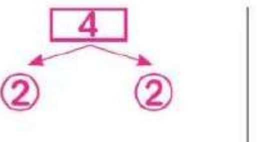
LCM = 2 X 2 X 2 X 3 X 3 = 72

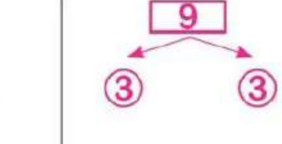
24 = 2 X 2 X 2 X 3

18 = 2 X 3 X 3

ⓒ 4 and 9







GCF = 1



LCM = 2 X 2 X 3 X 3 = 36

4 = 2 X 2

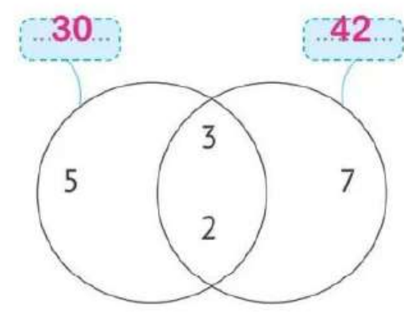
9 = 3 X 3

2 Complete the following table:

	Numbers	Prime Factors	GCF	LCM	Relatively prime Numbers (Yes or No?)
a	6 , 4	6 = 3 X 2 4 = 2 X 2	2	12	No
b	15 , 6	15 = 5 X 3 6 = 3 X 2	3	30	No
c	8 , 9	8 = 2 X 2 X 2 9 = 3 X 3	1	72	Yes
d	12 , 14	12 = 3 X 2 X 2 14 = 2 X 7	2	84	No
e	18 , 9	18 = 2 X 3 X 3 9 = 3 X 3	9	18	No
f	6 , 25	6 = 2 X 3 25 = 5 X 5	1	150	Yes

3 Complete using the Venn diagram in each of the following:

a 1 The two numbers represented in the Venn diagram are: 30 and 42 .



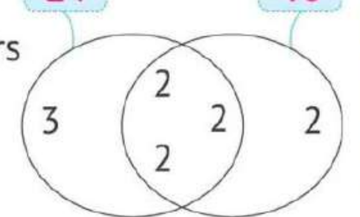
2 The common prime factors of the two numbers are 3 and 2 .

3 The GCF for the two numbers is 2 X 3 = 6 .

4 The LCM for the two numbers is 5 X 3 X 2 X 7 = 210 .

5 Are the two numbers relatively prime numbers? (Yes or No)

b 1 The two numbers represented in the Venn diagram are: ......24...... and ......16......



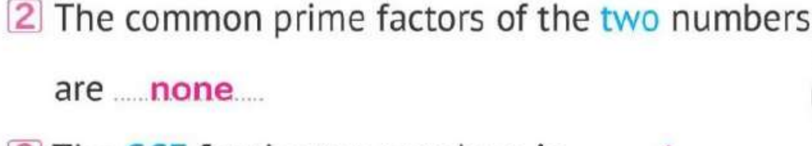
2 The common prime factors of the two numbers are ..2 , 2 , 2..

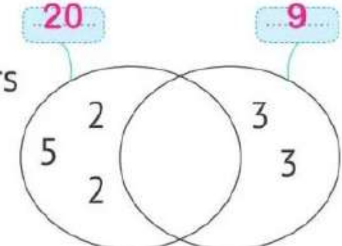
3 The GCF for the two numbers is......8...... .

4 The LCM for the two numbers is ......48...... .

5 Are the two numbers relatively prime numbers? (Yes or **No**)

c 1 The two numbers represented in the Venn diagram are: ......20...... and ......9......





2 The common prime factors of the two numbers are ....none....

3 The GCF for the two numbers is ......1...... .

4 The LCM for the two numbers is ......180...... .

5 Are the two numbers relatively prime numbers?



4 Complete the following:

a The prime number has only ......2...... factor(s).

b All prime numbers are odd numbers, except ......2...... is an even number.

c ......2...... is the smallest prime number.

d ......3...... is the smallest odd prime number.

e ....prime number.... is a number greater than one, and it has two factors only.

f The smallest two-digit prime number is ......11...... .

g Prime numbers less than 10 are ......2 , 3 , 5 , and 7...... .

h The prime factors of 21 are ......3 and 7...... .

i A number whose prime factors are 3, 3, and 2 is ......18......

j) Two numbers are relatively prime numbers, if their greatest common factor is ......1...... .

k) The least common multiple of the two relatively prime numbers is ....their product...... .

5 Choose the correct answer:

a) .... is a factor of all numbers. (0 or [1] or 2 or 3)

b) .... is a prime number. ([59] or 57 or 52 or 51)

c) 3 and 5 together are prime factors of the number ....
([30] or 53 or 18 or 25)

d) The prime number .... (has no factors or has only one factor or [has only two factors] or has only three factors)

e) 7, 5, 3 and 2 are .... numbers. (even or odd or [prime] or others)

f) The prime factors of 12 are .... (2×6 or 3×4 or [$2 \times 2 \times 3$] or 1×12)

g) If the prime factors of a number are $2 \times 2 \times 2$, then the number is ....
([8] or 4 or 6 or 222)

h) The greatest common factor of any two prime numbers is ....
(0 or [1] or their sum or their product)

i) The greatest common factor of two relatively prime numbers is ....
(0 or [1] or their sum or their product)

j) The least common multiple of any two prime numbers is ....
(the smallest number or 1 or their sum or [their product])

k) The least common multiple of two relatively prime numbers is ....
(the smallest number or 1 or their sum or [their product])

l) The greatest common factor of the numbers 4 and 15 is ....
(0 or [1] or 4 or 5)

m) 6 and .... are relatively prime numbers. (4 or 15 or [35] or 20)

n) The least common multiple of 9 and 8 is .... (9 or 8 or 1 or [72])

o) The greatest common factor of a number whose prime factors are 2 and 5 and a number whose factors are 3 and 7 is ....
(0 or 10 or [1] or 210)

Assessment on Lesson 2

Unit 1

1 Complete the following:

ⓐ Prime numbers greater than 10 and less than 20 are 11 , 13 , 17 , 19

ⓑ Prime factors of 18 are ....2 X 3 X 3............ .

ⓒ A number whose prime factors are 2, 3, 7 is ....42.......... .

ⓓ The greatest common factor of any two prime numbers is ....1.......... .

ⓔ The common multiple of all numbers is ....0.......... .

2 Choose the correct answer:

ⓐ The greatest common factor of two relatively prime numbers is ....

(0 or **1** or their sum or product)

ⓑ The least common multiple of two relatively prime numbers is ....

(0 or 1 or their sum or **their product**)

ⓒ The greatest common factor of the numbers 10 and 9 is ....

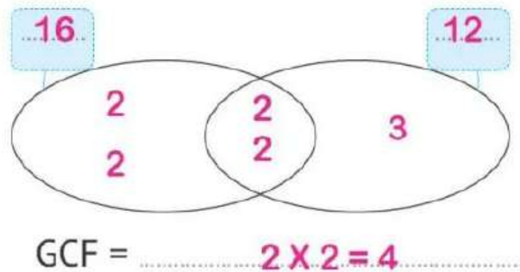
(0 or **1** or 4 or 5)

ⓓ 8 and .... are relatively prime numbers. (4 or 12 or **9** or 6)

ⓔ The two numbers .... are relatively prime numbers.

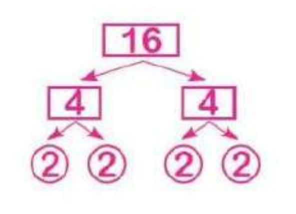
(2 and 4 or 4 and 6 or 6 and 9 or **9 and 4**)

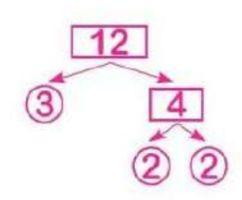
3 The GCF and LCM for the 16 and 12 using a Venn diagram:



GCF = ...2 X 2 = 4..........

LCM = 2 X 2 X 2 X 2 X 3 = 48





16 = 2 X 2 X 2 X 2

12 = ...2 X 2 X 3..........

Lesson 3 Writing Expressions Using the GCF

1 Complete the following:

ⓐ $7 \times (5 + 2) = (7 \times 5) + (7 \times 2)$

ⓑ $8 \times (2 + 9) = (8 \times 2) + (8 \times 9)$

ⓒ $8 \times (5 + 3) = (8 \times 5) + (8 \times 3)$

ⓓ $3 \times (3 + 7) = (3 \times 3) + (3 \times 7)$

ⓔ $5 \times (2 + 4) = (5 \times 2) + (5 \times 4)$

ⓕ $6 \times (8 + 7) = (6 \times 8) + (6 \times 7)$

ⓖ $7 \times (5 + 1) = (7 \times 5) + (7 \times 1)$

ⓗ $2 \times (4 + 3) = (2 \times 4) + (2 \times 3)$

2 A merchant has 18 kg of oranges and 27 kg of apples, so if the merchant wants to divide the oranges and apples in bags of the same mass.

ⓐ What is the largest number of bags that can be made for each type of fruit to be.

ⓑ How many kilograms of oranges will each bag contain?

ⓒ How many kilograms of apples will each bag contain?

ⓐ The largest number of bags = 9 bags

ⓑ The mass of oranges in each bag = 18 ÷ 9 = 2 Kg

ⓒ The mass of apples in each bag = 27 ÷ 9 = 3 Kg

18 = 2 X 3 X 3
27 = 3 X 3 X 3

GCF = 3 X 3 = 9

3 **A hospital staffed by 12 doctors and 28 nurses.**

ⓐ Find the greatest number of equal groups that can be made of doctors and nurses together.

ⓑ How many doctors are in each group?

ⓒ How many nurses are in each group?

ⓐ Greatest number of groups = 4 groups

ⓑ Number of doctors in each group

= 12 ÷ 4 = 3 doctors

ⓒ Number of nurses in each group = 28 ÷ 4 = 7 nurses

12 = 2 X 2 X 3
28 = 2 X 2 X 7

GCF = 2 X 2 = 4

4 **Mahmoud wanted to divide the 24 pens and 36 notebooks into groups, so that each group contained the same number of tools.**

Write a numerical expression to express is the largest number of groups that can be configured for each type of supply to have for each group?

The numerical expression:

(12 X 2) + (12 X 3) = 12 X (2 + 3)

24 = 2 X 2 X 2 X 3
36 = 2 X 2 X 3 X 3

GCF = 2 X 2 X 3 = 12

5 **Nour prepared bags contain snacks. He has 6 oranges and 12 pieces of fruit. Nour wants the snacks in the bags to be distributed evenly without any food left.**

Write a numerical expression to express the number of bags of snacks can Nour prepare?

The numerical expression:

(6 X 1) + (6 X 2) = 6 X (1 + 2)

6 = 2 X 3
12 = 2 X 3 X 2

GCF = 2 X 3 = 6

Assessment on Lesson 3

Unit 1

1 **Choose the correct answer:**

ⓐ $4 \times (2 + 9) =$ ....

(**[$(4 \times 2) + (4 \times 9)$]** or $4 \times 2 + 9$ or $4 \times 2 \times 9$ or $(4 + 2) \times (4 + 9)$)

ⓑ $(6 \times 3) + (6 \times 2) =$ ....

($6 \times 3 \times 2$ or $6 + (3 \times 2)$ or **[$6 \times (3 + 2)$]** or $6 \times 3 \times 6 \times 2$)

ⓒ .... $\times (5 + 1) = (7 \times 5) + (7 \times 1)$ (5 or 1 or **[7]** or 6)

ⓓ The GCF for 18 and 12, is .... (**[6]** or 9 or 2 or 3)

ⓔ The common multiple of all numbers is .... (**[0]** or 1 or 2 or 3)

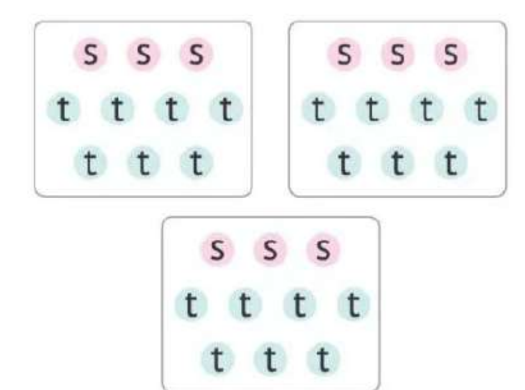
2 **Write the number expression for each of the following figures:**

ⓐ

s s s s / t t t (4 boxes)

...4... $\times$ (...4... + ...3...)

ⓑ



...3... $\times$ (...3... + ...7...)

3 **Sameh wanted to divide the 21 pens and 35 notebooks into groups, so that each group contained the same number of supplies. Write a numerical expression to express the largest number of sets that can be made for each type of supplies so that each set has the same number?**

The numerical expression:

$(7 \times 3) + (7 \times 5) = 7 \times (3 + 5)$

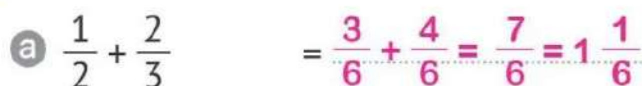
$21 = 3 \times 7$
$35 = 7 \times 5$

GCF = 7

Lesson 4 Analyzing Least Common Multiples



1 Find the result: (in the simplest form)



ⓐ $\frac{1}{2} + \frac{2}{3}$ $= \frac{3}{6} + \frac{4}{6} = \frac{7}{6} = 1\frac{1}{6}$

ⓑ $4\frac{3}{4} + 9\frac{5}{12}$ $= 4\frac{9}{12} + 9\frac{5}{12} = 13\frac{14}{12} = 14\frac{2}{12} = 14\frac{1}{6}$

ⓒ $\frac{1}{4} + \frac{11}{16}$ $= \frac{4}{16} + \frac{11}{16} = \frac{15}{16}$

ⓓ $5\frac{7}{10} + 8\frac{3}{4}$ $= 5\frac{14}{20} + 8\frac{15}{20} = 13\frac{29}{20} = 14\frac{9}{20}$

ⓔ $1\frac{2}{3} + 1\frac{15}{24}$ $= 1\frac{16}{24} + 1\frac{15}{24} = 2\frac{31}{24} = 3\frac{7}{24}$

ⓕ $\frac{1}{4} - \frac{1}{6}$ $= \frac{3}{12} - \frac{2}{12} = \frac{1}{12}$

ⓖ $\frac{5}{6} - \frac{1}{9}$ $= \frac{15}{18} - \frac{2}{18} = \frac{13}{18}$

ⓗ $9\frac{1}{10} - 5\frac{7}{12}$ $= 9\frac{6}{60} - 5\frac{35}{60} = 8\frac{66}{60} - 5\frac{35}{60} = 3\frac{31}{60}$

ⓘ $5\frac{1}{7} - 2\frac{3}{4}$ $= 5\frac{4}{28} - 2\frac{21}{28} = 4\frac{32}{28} - 2\frac{21}{28} = 2\frac{11}{28}$

ⓙ $1\frac{2}{3} - 1\frac{3}{5}$ $= 1\frac{10}{15} - 1\frac{9}{15} = \frac{1}{15}$

2 Nagy bought $3\frac{1}{2}$ kg of oranges and $4\frac{1}{4}$ kg of bananas.
What is the total mass of fruit that Nagy bought?

The total mass $= 3\frac{1}{2} + 4\frac{1}{4} = 3\frac{2}{4} + 4\frac{1}{4} = 7\frac{3}{4}$ Kg

3 Shimaa bought a pen for $9\frac{1}{2}$ pounds, a ruler for $5\frac{1}{4}$ pounds, and a notebook for 4 pounds. How much did Shimaa pay?

shimaa paid $= 9\frac{1}{2} + 5\frac{1}{4} + 4 = 9\frac{2}{4} + 5\frac{1}{4} + 4 = 18\frac{3}{4}$ pounds

4 Wael collected $3\frac{3}{4}$ kilograms of dates and gave $2\frac{1}{5}$ kilograms to his friend. How many kilograms are left with Wael?

The left $= 3\frac{3}{4} - 2\frac{1}{5} = 3\frac{15}{20} - 2\frac{4}{20} = 1\frac{11}{20}$ Kg

5 **Hani is studying $4\frac{1}{2}$ hours per day , in which he spends $1\frac{1}{3}$ hours studying mathematics. How much time is left for studying the rest of the subjects?**

The left time = $4\frac{1}{2} - 1\frac{1}{3} = 4\frac{3}{6} - 1\frac{2}{6} = 3\frac{1}{6}$ hours

6 **Mohammed bought 3 pizzas of the same size and divided each of them in different ways for lunch with his friends. And after the end of the meal, Muhammad noticed that there were some remaining pieces of pizza, which are as follows:**

$\frac{1}{6}$ of the first pizza, $\frac{1}{4}$ of the third pizza, $\frac{1}{3}$ of the last pizza

ⓐ What is the total number of pizzas remaining?

Total number of pizzas remaining =

$$\frac{1}{6} + \frac{1}{4} + \frac{1}{3} = \frac{2}{12} + \frac{3}{12} + \frac{4}{12} = \frac{9}{12} = \frac{3}{4} \text{ pizza}$$

ⓑ How many pizza did Mohamed and his friends eat?

They ate = $3 - \frac{3}{4} = 2\frac{4}{4} - \frac{3}{4} = 2\frac{1}{4}$ pizza

7 **A road of 15 km in length is paved in three stages, with $6\frac{2}{5}$ km in the first stage, $4\frac{1}{2}$ km in the second stage.**

How long is the distance paved in the third stage?

The distance paved in 1st and 2nd stage =

$$6\frac{2}{5} + 4\frac{1}{2} = 6\frac{4}{10} + 4\frac{5}{10} = 10\frac{9}{10} \text{ Km}$$

The distance paved in 3rd stage =

$$15 - 10\frac{9}{10} = 14\frac{10}{10} - 10\frac{9}{10} = 4\frac{1}{10} \text{ Km}$$



8 **A family bought a set of plastic bags to store strawberries for later use, each bag containing 8 strawberries.**

After a while, the mother opened 5 bags of strawberries for the family members to try some of each, trying to find the bags that contained the best taste.

The bags contained the remaining parts:

$$\frac{1}{8}, \frac{3}{8}, \frac{2}{8}, \frac{1}{8}, \frac{2}{8}$$

ⓐ If the mother wants to repackage the remaining pieces of fruit to form whole packets, how many bags remain?

Bags remain $= \frac{1}{8} + \frac{3}{8} + \frac{2}{8} + \frac{1}{8} + \frac{2}{8} = \frac{9}{8} = 1\frac{1}{8}$ **bags**

ⓑ Since there are 8 strawberries in each of the 5 bags, how many bags did the family eat?

The family ate $= 5 - 1\frac{1}{8} = 4\frac{8}{8} - 1\frac{1}{8} = 3\frac{7}{8}$ **bags**

Assessment on Lesson 4

Unit 1

1 Choose the correct answer:

a) $\frac{3}{5} + \frac{9}{10} =$ .... $\left(\frac{1}{10} \text{ or } \boxed{1\frac{1}{2}} \text{ or } 1\frac{1}{5} \text{ or } \frac{12}{15}\right)$

b) $1\frac{4}{5} + 2\frac{1}{3} =$ .... $\left(\boxed{4\frac{2}{15}} \text{ or } 3\frac{2}{18} \text{ or } 4\frac{5}{8} \text{ or } 3\frac{5}{8}\right)$

c) $3\frac{1}{2} -$ .... $= 1\frac{3}{8}$ $\left(2\frac{5}{8} \text{ or } 1\frac{1}{8} \text{ or } 1\frac{5}{8} \text{ or } \boxed{2\frac{1}{8}}\right)$

d) $3\frac{5}{6} + 1\frac{1}{3} = 4 +$ .... $\left(2 \text{ or } \boxed{1\frac{1}{6}} \text{ or } 2\frac{2}{6} \text{ or } 4\frac{2}{3}\right)$

2 Complete the following:

a) $4\frac{1}{6}$ $- 1\frac{2}{3} = 2\frac{1}{2}$

b) $2\frac{1}{2} - 1\frac{7}{8} =$ $\frac{5}{8}$

c) $2\frac{1}{3} + 1\frac{1}{4} =$ $3\frac{7}{12}$

3 Answer the following:

a) Hanaa has $15\frac{1}{2}$ pounds, she bought a ruler for $4\frac{1}{2}$ pounds and a pen for $5\frac{1}{2}$ pounds. How much money is left with Hanaa?

Hanaa paid = $4\frac{1}{2} + 5\frac{1}{2} = 9\frac{2}{2} = 10$ pounds

The left money = $15\frac{1}{2} - 10 = 5\frac{1}{2}$ pounds

b) You bought a package of dates that contained 16 dates. You had already eaten one when you remembered that you owed your friend half a packet of dates.

1. What fraction represents the number of dates that you have to give to your friend? $\frac{1}{2} = \frac{8}{16}$

2. After giving your friend his share, what fraction is the remaining amount of the fruit packet? $\frac{7}{16}$

Assessment 1 on Unit 1



First: **Choose the correct answer:**

ⓐ 18 is divisible by .... (12 or 7 or 8 or [6])

ⓑ A number is divisible by 5, if its Ones digit is ....

(2 or 5 or [0 or 5] or 2 or 3 or 2 or 0)

ⓒ All .... numbers are divisible by 2.

(odd or [even] or prime or whole)

ⓓ .... is a factor of all numbers. (0 or [1] or 2 or 3)

ⓔ 7, 5, 3, and 2 are .... numbers. (even or odd or [prime] or otherwise)

ⓕ The greatest common factor of any two prime numbers is ....

(0 or [1] or their sum or their product)

ⓖ The least common multiple of two prime numbers is ....

(the greatest number or 1 or their sum or [their product])

ⓗ $6 \times (7 + 5) =$ ....

([$(6 \times 7) + (6 \times 5)$] or $6 \times 7 + 5$ or $6 \times 7 \times 5$ or $(6 + 7) \times (6 + 5)$)

ⓘ $(2 \times 8) + (2 \times 3) =$ ....

($2 \times 8 \times 3$ or $2 + (8 \times 3)$ or [$2 \times (8 + 3)$] or $2 \times 8 \times 2 \times 3$)

ⓙ $1\frac{3}{4} + 2\frac{1}{2} =$ .... ([$4\frac{1}{4}$] or $3\frac{1}{4}$ or $3\frac{4}{6}$ or 4)

Second: **Complete the following:**

ⓐ 21 is a multiple of 7, so ......21...... is divisible by ......7...... .

ⓑ 39 is divisible by 3, so ......3...... is a factor of ......39...... .

ⓒ The prime number has only ......2...... factor(s).

ⓓ All prime numbers are odd numbers, except ......2...... is an even number.

ⓔ ......2...... is the smallest prime number.

(f) Any two numbers are relatively prime numbers if their greatest common factor is ...1... .

(g) The least common multiple of any two prime numbers is **their product**

(h) $8 \times (2 + 7) = (\ 8 \times 2\ ) + (\ 8 \times 7\ )$

(i) $3\frac{1}{5} + 2\frac{3}{10} = 5\frac{1}{2}$

Third: Answer the following:

1. Find the result:

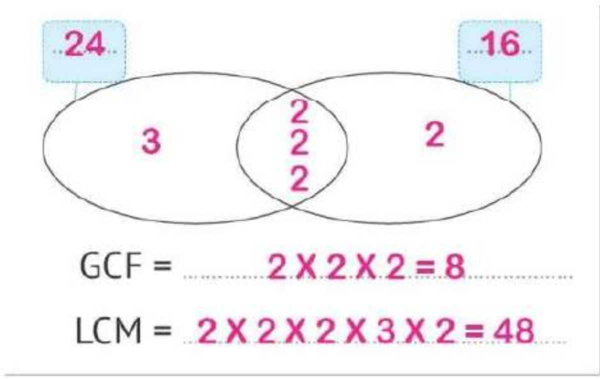
(a) $5\frac{3}{8} + 2\frac{5}{6} = 5\frac{9}{24} + 2\frac{20}{24} = 7\frac{29}{24} = 8\frac{5}{24}$

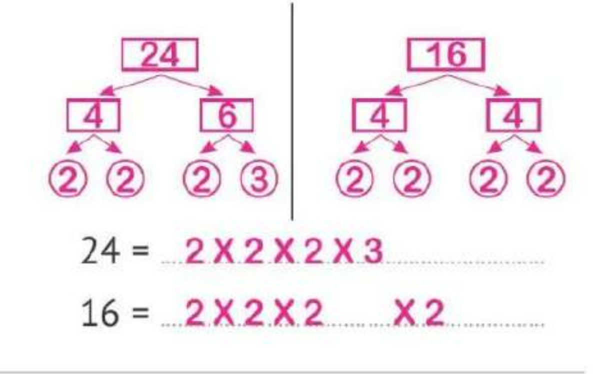
(b) $7\frac{1}{4} - 3\frac{3}{5} = 7\frac{5}{20} - 3\frac{12}{20} = 6\frac{25}{20} - 3\frac{12}{20} = 3\frac{13}{20}$

2. Maryam has 25 blue roses and 15 red roses that she wants to distribute in bouquets, so that each bouquet contains the same number of roses of each color. Write numerical expressions using the greatest common factor.

$(5 X 5) + (5 X 3) = 5 X (5 + 3)$

3. Find the GCF and LCM using Venn diagram for numbers 24 and 16:





GCF = 2 X 2 X 2 = 8

LCM = 2 X 2 X 2 X 3 X 2 = 48

24 = 2 X 2 X 2 X 3

16 = 2 X 2 X 2 X 2

4. Hany has 25 pounds. He bought a piece of cake for $9\frac{1}{2}$ pounds.

How much money is left with Hany?

The left money $= 25 - 9\frac{1}{2} = 24\frac{2}{2} - 9\frac{1}{2} = 15\frac{1}{2}$ pounds

Unit 2 Rational Numbers

Concept 2.1 Explore the Number Line

Lessons 1&2 Using a Number Line to Describe Data / Using a Number Line and Symbols to Compare Numbers

1 **Write an integer to represent each of the following:**

a) The temperature is 12°C below zero. (– 12)

b) The temperature is 40°C. (40)

c) Salma dives 10 meters below sea level. (– 10)

d) Ahmed withdrew 50 pounds from his savings account. (– 50)

e) The height of the tree is 5 meters. (5)

f) The value of the loss is 20 pounds. (– 20)

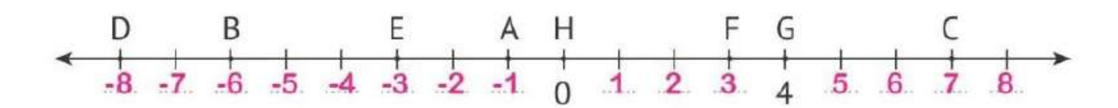
g) The value of the gain is 16 pounds. (16)

h) The amount of weight gain is 3 kilograms. (3)

i) Hossam moved three steps back. (– 3)

j) Ayman lost 150 pounds. (– 150)

2 **Write the numbers represented by the letters shown on the following number line:**



a) A → -1 b) B → -6 c) C → 7 d) D → -8

e) E → -3 f) F → 3 g) G → 4 h) H → 0

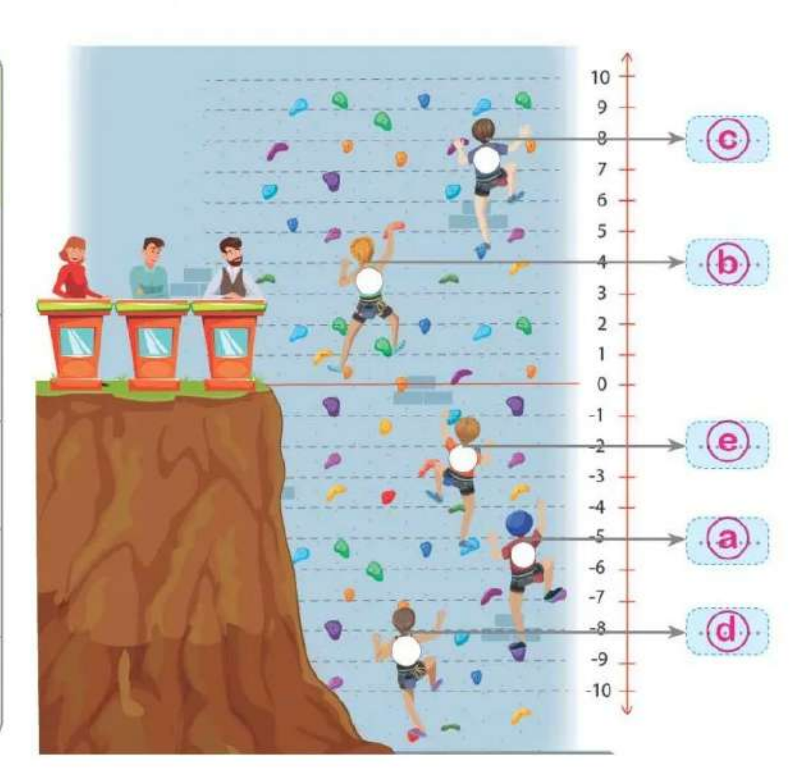
3 **A group of people go indoor rock climbing together. There is an elevated platform in the middle of the giant rock wall.**

Each climber's location is represented by their distance from the platform.

The following table shows the positions of each of the climbers relative to the platform (the platform location represents 0).

Locate each person on the following number line.

Person	The Position from the Platform in Meters
a	−5
b	4
c	8
d	−8
e	−2



4 **Write the next number and the previous number for each of the following numbers:**

The Previous Number	9	-8	-1	-6	8
The Number	10	−7	0	−5	9
The Next Number	11	-6	1	-4	10

5 Complete using (< , = or >):

a) −5 [<] 9	b) 2 [<] 6	c) 7 [>] 3
d) −1 [>] −12	e) −5 [>] −9	f) −2 [<] 4
g) 1 [>] 0	h) −6 [<] 6	i) 7 [>] −7
j) 5 [=] 5	k) −3 [=] −3	l) −1 [<] 0

6 Arrange the following numbers in ascending and descending order:

a) 5 , −6 , 8 , −3 , 0

Ascending order: -6 , -3 , 0 , 5 , 8 .

Descending order: 8 , 5 , 0 , -3 , -6 .

b) −1 , 1 , 0 , −3 , 3

Ascending order: -3 , -1 , 0 , 1 , 3 .

Descending order: 3 , 1 , 0 , -1 , -3 .

7 Write the opposite of each of the following numbers:

a) −9 → 9	b) 3 → -3	c) −12 → 12
d) 0 → 0	e) −1 → 1	f) 1 → -1

8 Complete the following:

a) The integer that expresses "the temperature is 15 below zero" is -15 .

b) The integer that expresses "the height of the school building is 25 meters" is 25 .

c) The next number to −5 is -4 .

d) The number that comes before 0 is -1 .

e The number "–12" is the opposite of the number ..12.. .

f The opposite of "10" is ..-10.. .

g The smallest number in counting numbers is ..1.. .

h The smallest positive integer is ..1.. .

i The smallest non-negative integer is ..0.. .

j The number and its opposite is on ..the same distance.. from zero, but on two opposite sides on the number line.

9 Choose the correct answer from the brackets:

a –3 is located to the right of the number .... on the number line.

([–4] or 4 or –2 or 2)

b The number that comes just before .... is –1. (–2 or 2 or [0] or 1)

c –9 > .... ([–15] or 8 or –8 or 10)

d The opposite of –12 is .... (–12 or [12] or 1 or 2)

e The number .... is neither a positive nor a negative number.

([0] or 1 or –1 or 10)

f The opposite of 5 > .... (–4 or 4 or [–6] or 6)

g The largest negative integer is .... ([–1] or 1 or –100 or 0)

h The largest non-positive integer is .... (–1 or 1 or –100 or [0])

i All negative numbers are .... zero.

(greater than or [less than] or equal to)

j All positive numbers are .... zero.

([greater than] or less than or equal to)

Assessment on Lessons 1&2

Unit 2

1 Choose the correct answer:

a) The integer that expresses (the depth of a well of 5 meters) is ....
(**−5** or 5 or −10 or 10)

b) An integer between the numbers 2 and −2 is ...... (**−1** or −3 or 3 or −4)

c) The number that comes just after −9 is .... (−10 or **−8** or 10 or 8)

d) −25 ☐ −12 (> or = or **<**)

e) 6 < .... (−8 or **8** or −9 or −7)

2 Complete the following:

a) The integer that expresses "move forward 6 steps" is ...6....

b) Integers between −3 and 2 are ...−2 , −1 , 0 , 1....

c) The additive inverse of 8 is ...−8....

d) The smallest positive integer is ...1....

e) −5 , −4 , −3 , −2 , ...−1... , ...0... , ...1... , ...2... .

3 Arrange the following integers in an ascending order:

−3 , 9 , −32 , 0 , 2

...−32... , ...−3... , ...0... , ...2... , ...9...

4 Locate each of the following points on the number line:

Point	A	B	C	D	E
Number	0	3	−2	5	−3

(Number line answer: E at −3, C at −2, A at 0, B at 3, D at 5)

Concept 2.2 Investigate Rational Numbers

Lessons 3&4 Analyzing Rational Numbers by Using Models / Comparing and Ordering Rational Numbers

1 Write each of the following numbers in fraction form $\frac{a}{b}$, then write its additive inverse:

Number	2.5	−0.8	5	$-3\frac{1}{2}$	$2\frac{3}{4}$
Fraction Form $\frac{a}{b}$	$\frac{25}{10}$	$\frac{-8}{10}$	$\frac{5}{1}$	$\frac{-7}{2}$	$\frac{11}{4}$
Additive Inverse	-2.5	0.8	-5	$3\frac{1}{2}$	$-2\frac{3}{4}$

2 Complete using (belongs) or (does not belong):

(a) 25 ...belongs... to a set of counting numbers.

(b) −12 ...doesn't belongs... to a set of counting numbers.

(c) $2\frac{5}{7}$ ...doesn't belongs... to a set of counting numbers.

(d) 0 ...doesn't belongs... to a set of counting numbers.

(e) −125 ...doesn't belongs... to a set of natural numbers.

(f) 0 ...belongs... to a set of natural numbers.

(g) $\frac{3}{8}$ ...doesn't belongs... to a set of natural numbers.

(h) −56.5 ...doesn't belongs... to a set of integers.

(i) 19 ...belongs... to a set of integers.

(j) $-\frac{4}{5}$ ...belongs... to a set of rational numbers.

3 Write a subset or not a subset:

a. A set of counting numbers is ...a subset... of a set of natural numbers.

b. A set of counting numbers is ...a subset... of a set of integers numbers.

c. A set of natural numbers is ...not a subset... of a set of counting numbers.

d. A set of natural numbers is ...a subset... of a set of integers numbers.

e. A set of integers numbers is ...not a subset... of a set of natural numbers.

f. A set of integers numbers is ...a subset... of a set of rational numbers.

g. A set of rational numbers is ...not a subset... of a set of integers numbers.

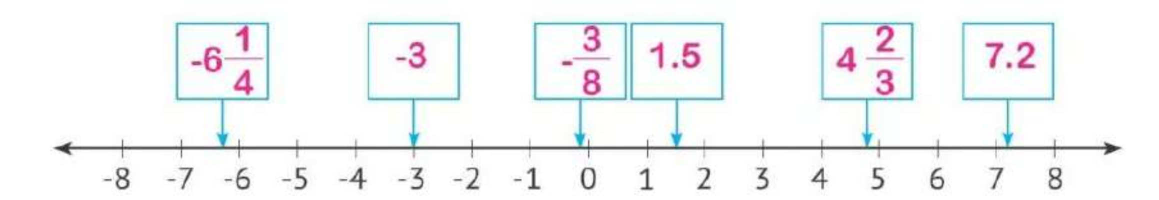
h. A set of rational numbers is ...not a subset... of a set of natural numbers.

4 Classify all the following numbers according to the number sets shown (put a tick ✓):

	Number	Counting Numbers	Natural Numbers	Integers	Rational Numbers	Subset
a	4	✓	✓	✓	✓	Counting
b	0.5857	✗	✗	✗	✓	Rational
c	0	✗	✓	✓	✓	Natural
d	– 11	✗	✗	✓	✓	Integer
e	4.9	✗	✗	✗	✓	Rational
f	$\frac{43}{5-5}$	✗	✗	✗	✗	None
g	12	✓	✓	✓	✓	Counting
h	– 455	✗	✗	✓	✓	Integer
i	– 28.765	✗	✗	✗	✓	Rational
j	$-6\frac{2}{3}$	✗	✗	✗	✓	Rational

5 **Put the following numbers in the appropriate places on the following number line:**

$$-3 \;,\; 1.5 \;,\; -\frac{3}{8} \;,\; -6\frac{1}{4} \;,\; 4\frac{2}{3} \;,\; 7.2$$



6 **Complete using (< , = or >):**

- (a) $\frac{2}{5}$ [<] $\frac{3}{5}$
- (b) $-\frac{6}{7}$ [<] $\frac{7}{7}$
- (c) $-\frac{5}{9}$ [<] $\frac{8}{9}$
- (d) $\frac{3}{8}$ [<] $\frac{3}{5}$
- (e) $-\frac{2}{5}$ [<] $\frac{2}{3}$
- (f) $-\frac{4}{5}$ [<] $\frac{4}{7}$
- (g) $\frac{2}{7}$ [<] $\frac{1}{3}$
- (h) $\frac{3}{4}$ [>] $-\frac{4}{5}$
- (i) $-\frac{2}{7}$ [>] $-\frac{3}{4}$
- (j) 0.5 [=] $\frac{1}{2}$
- (k) 2.4 [>] $\frac{24}{100}$
- (l) $-2\frac{1}{3}$ [<] 0

7 **Arrange each of the following groups of numbers in ascending and descending order:**

(a) $2\frac{2}{3} \;,\; -5.5 \;,\; 7\frac{1}{4} \;,\; 3.7 \;,\; -1\frac{3}{5}$

Ascending order: -5.5 , $-1\frac{3}{5}$, $2\frac{2}{3}$, 3.7 , $7\frac{1}{4}$.

Descending order: $7\frac{1}{4}$, 3.7 , $2\frac{2}{3}$, $-1\frac{3}{5}$, -5.5 .

(b) $\frac{1}{2} \;,\; \frac{2}{3} \;,\; -0.82 \;,\; 0.25 \;,\; -\frac{1}{2}$

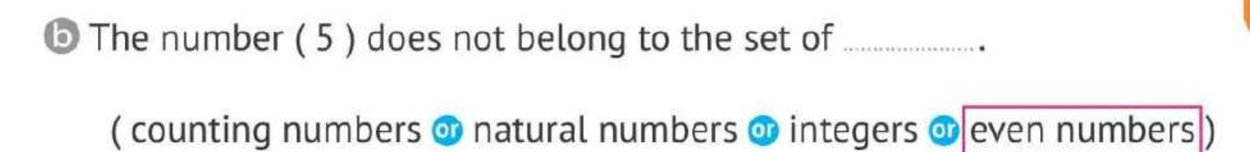
Ascending order: -0.82 , $-\frac{1}{2}$, 0.25 , $\frac{1}{2}$, $\frac{2}{3}$.

Descending order: $\frac{2}{3}$, $\frac{1}{2}$, 0.25 , $-\frac{1}{2}$, -0.82 .

6 Choose the correct answer from the brackets:

ⓐ The number (–2.5) belongs to the set of ………………… .

(counting numbers or natural numbers or integers or **rational numbers**)



ⓑ The number (5) does not belong to the set of ………………… .

(counting numbers or natural numbers or integers or **even numbers**)

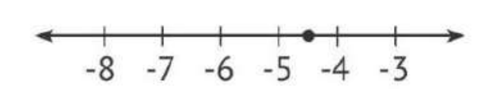
ⓒ The number (0) belongs to the set of ………………… .

(counting numbers or **natural numbers** or negative integers or odd numbers)

ⓓ The opposite of $-\frac{3}{4}$ is ………………… . ($1\frac{1}{3}$ or $\frac{4}{3}$ or $-\frac{4}{3}$ or $\boxed{\frac{3}{4}}$)

ⓔ -6 in $\frac{a}{b}$ form is ………………… . ($\frac{6}{1}$ or $\frac{1}{6}$ or $\boxed{-\frac{6}{1}}$ or $-\frac{1}{6}$)

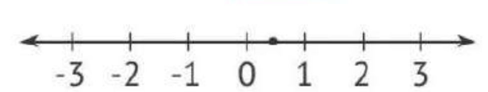
ⓕ The rational number represented on



the corresponding number line is ………………… .

($4\frac{2}{3}$ or $5\frac{2}{3}$ or $\boxed{-4\frac{2}{3}}$ or $-5\frac{2}{3}$)

ⓖ The rational number represented on



the corresponding number line is ………………… (– 1.5 or –0.5 or 1.5 or **0.5**)

ⓗ $\frac{3}{5}$ ▭ $-\frac{5}{3}$ ($\boxed{>}$ or $=$ or $<$)

ⓘ $-\frac{7}{4} >$ ………………… ($\boxed{-\frac{8}{4}}$ or $\frac{8}{4}$ or $-1\frac{3}{4}$ or $\frac{7}{4}$)

ⓙ $\frac{2}{3} <$ ………………… ($\frac{2}{3}$ or $-1\frac{2}{3}$ or $-\frac{3}{2}$ or $\boxed{\frac{3}{2}}$)

Assessment on Lessons 3&4

Unit 2

1 Choose the correct answer:

ⓐ The rational number represented on the corresponding number line is ....

(number line marked -8, -7, -6, -5, -4, -3)

($4\frac{1}{2}$ or $5\frac{1}{2}$ or $-5\frac{1}{2}$ or **$-4\frac{1}{2}$**)

ⓑ −2 belongs to the set of ....

(counting numbers or natural numbers or **negative integers** or odd numbers)

ⓒ The set of integers is a subset of the set of .... numbers.

(counting or natural or even or **rational**)

ⓓ The additive inverse of - 5 is ....

(**5** or −5 or $-\frac{1}{5}$ or $\frac{1}{5}$)

ⓔ $-2\frac{3}{4}$ is between the two whole numbers ....

(2,3 or 1,2 or **−2, − 3** or −1, −2)

2 Complete each of the following:

ⓐ The additive inverse of 5.9 is ..-5.9.... .

ⓑ The rational number −5.6 lies between the two whole numbers ......-5...... and .....- 6..... on the number line.

ⓒ A set of natural numbers is a subset of a set of .integer. and also a subset of a set of rational number.

ⓓ −2.5 in the form $\frac{a}{b}$ is $\frac{-25}{10} = \frac{-5}{2}$ (In its simplest form)

3 Arrange the following numbers in a descending order:

7.7 , 7 , −3.8 , $7\frac{1}{2}$, $-3\frac{1}{5}$

..7.7.. , ..$7\frac{1}{2}$.. , ..7.. , ..$-3\frac{1}{5}$.. , ..-3.8..

Concept 2.3 Interpret and Use Absolute Value

Lessons 5&6 Exploring Absolute Value / Comparing Absolute Values

1 Find the value of each of the following:

a) $|-5| = 5$ b) $|-15| = 15$ c) $|6| = 6$

d) $|45| = 45$ e) $|\frac{7}{9}| = \frac{7}{9}$ f) $|7\frac{3}{5}| = 7\frac{3}{5}$

g) $|-\frac{3}{4}| = \frac{3}{4}$ h) $|-7\frac{2}{3}| = 7\frac{2}{3}$ i) $|0.03| = 0.03$

j) $|-0.7| = 0.7$ k) $|7.04| = 7.04$ l) $|-6.5| = 6.5$

2 Complete using (< , = or >):

a) $-0.7 < |-0.7|$ b) $|-9| > |-8|$

c) $5.07 = |-5.07|$ d) $|3.4| = |-3.4|$

e) $|1.8| = 1.8$ f) $|-8.2| > -7.9$

g) $|-2.71| > 2.7$ h) $|-75| > 64$

i) $|\frac{2}{3}| > |-\frac{1}{3}|$ j) $-\frac{7}{8} < |-\frac{7}{9}|$

k) $|3\frac{1}{4}| < |-7\frac{2}{5}|$ l) $4\frac{3}{4} > |2\frac{2}{3}|$

m) $|-\frac{8}{3}| = |2\frac{2}{3}|$ n) $-3\frac{4}{5} < |-\frac{3}{2}|$

o) $|-3| > -3$ p) $-|\frac{3}{4}| < |-\frac{3}{4}|$

Theme 1

3 **Arrange each group of the following numbers in ascending and descending order:**

ⓐ $8 \ , \ -17 \ , \ |-3| \ , \ -9 \ , \ |12|$

Ascending order: -17 , -9 , |-3| , 8 , |12| .

Descending order: |12| , 8 , |-3| , -9 , -17 .

ⓑ $0.75 \ , \ -\frac{5}{8} \ , \ |-0.5| \ , \ -\frac{3}{4} \ , \ |0.25|$

Ascending order: $-\frac{3}{4}$, $-\frac{5}{8}$, |0.25| , |-0.5| , 0.75 .

Descending order: 0.75 , |-0.5| , |0.25| , $-\frac{5}{8}$, $-\frac{3}{4}$.

4 **Complete the following:**

ⓐ If $5 = |a|$, then a = 5 or -5

ⓑ If $b = |-7|$, then b = 7 .

ⓒ If $n = |9|$, then n = 9 .

ⓓ $-|5| =$ -5

ⓔ $-|-4| =$ -4

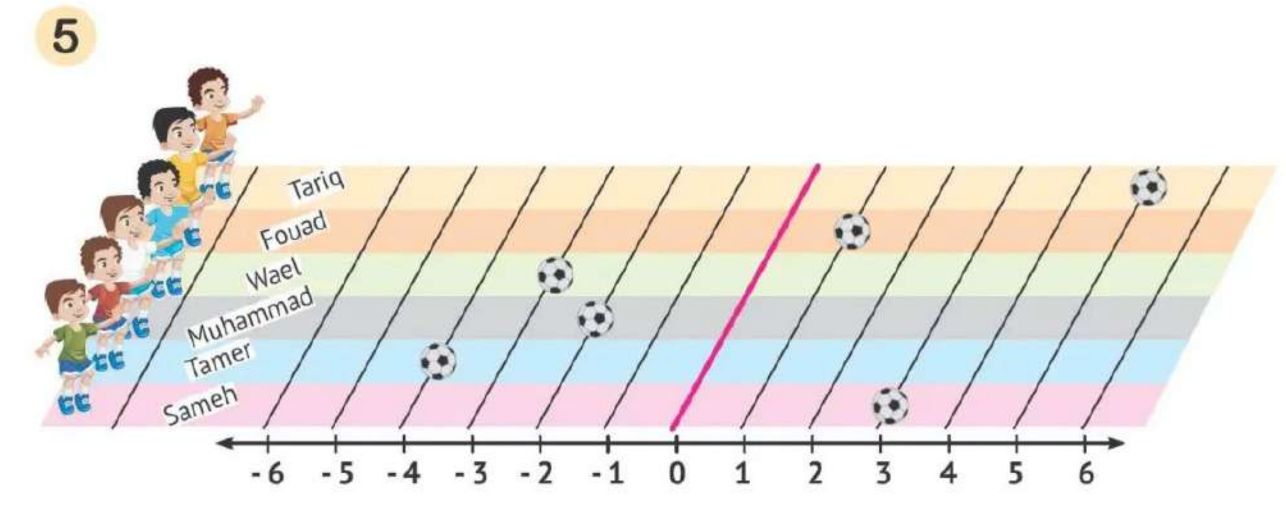
ⓕ $|9| + |-9| =$ 9 + 9 = 18

ⓖ If the temperature recorded in Moscow is -6 and the temperature recorded in Cairo is 4, then the temperature of Moscow is lower because -6 < 4.

ⓗ If the height of mountain (A) above sea level is 1,200 m, and the height of mountain (B) above sea level is 1,400 m, then the mountain (A) lies at a distance closer to sea level.

ⓘ Which is bigger -7.22 or -7.2? -7.2

5



On sports day, a group of children stood in one line to throw the ball towards a line parallel to them. And the rules of the game dictate that the winner is the one who throws the ball to the nearest distance from the red line (before or after it), and a number line was drawn to know the distance at which the ball stops.

The results for the students were as shown

Child	Sameh	Tamer	Muhammad	Wael	Fouad	Tariq
Distance	3	−4	−2	−3	1	5

a Complete the following:

1. The children who throw the ball before the line are Tamer , Muhammad, Wael .
2. The children who throw the ball after the line are Fouad , sameh , Tariq .
3. The child whose ball has reached the closest distance from the line is Fouad (the winner).
4. The child whose ball has reached the farthest distance from the line is Tariq .

b Arrange the children according to the distance between their ball and the red line, reaching from the least to the greatest:

Fouad , Muhammad , Wael , Sameh , Tamer , Tariq .

Assessment on Lessons 5&6

Unit 2

1 Choose the correct answer:

ⓐ $|-1.5| =$ .... (**1.5** or -1.5 or 15 or -15)

ⓑ $|6| =$ .... (**6** , or -6 or 3 or -3)

ⓒ The absolute value of 2.7 is........ (-2.7 or **2.7** or 27 or -27)

ⓓ The absolute value of "zero" is .... (10 or **0** or -1 or 1)

ⓔ The larger the absolute value, the .... zero.

(closer number to or **farther number to** or equal number to)

2 Complete the following:

ⓐ If $5 = |m|$, then $m =$ ...5... or ...-5... .

ⓑ If $k = |-3.5|$, then $k =$ ...3.5... .

ⓒ If $k = |9|$, then $k =$ ...9... .

ⓓ Opposite numbers on a number line have the ...same... absolute values.

ⓔ ...0.7... is closer to the number zero. (-2.5 or 0.7)

3 Arrange the following numbers in a descending order:

$$0.75 \ , \ -\frac{1}{8} \ , \ \left|-\frac{1}{2}\right| \ , \ -\frac{1}{4} \ , \ |0.25|$$

...0.75... , ...$\left|-\frac{1}{2}\right|$... , ...$|0.25|$... , ...$-\frac{1}{8}$... , ...$-\frac{1}{4}$... .

4 Complete using (<, = or >):

ⓐ -0.9 [<] $|-0.9|$

ⓑ $|-1.5|$ [>] -1.5

ⓒ $\left|3\frac{1}{4}\right|$ [<] $\left|-4\frac{1}{3}\right|$

ⓓ $-\frac{2}{5}$ [<] $\left|-\frac{1}{2}\right|$

Assessment on Unit 2



First: **Choose the correct answer:**

a) −7 is to the right of .... on the number line. (−8 or 8 or −6 or 6)

b) .... is neither a positive number nor a negative number. (0 or 1 or −1 or 10)

c) The largest non-negative integer is .... (−1 or 1 or 100 or 0)

d) (−5.7) belongs to the set of ....

(natural numbers or integers or rational numbers or counting numbers)

e) The absolute value of "0" belongs to the set of ....

(counting numbers or natural numbers or negative integers or odd numbers)

f) The additive inverse of $-\frac{2}{3}$ is .... ($1\frac{1}{2}$ or $-\frac{3}{1}$ or $\frac{3}{2}$ or $\frac{2}{3}$)

g) −0.3 in the form $\frac{a}{b}$ is .... ($-\frac{3}{10}$ or $-\frac{1}{3}$ or $-\frac{3}{1}$ or $\frac{10}{3}$)

h) The rational number represented on the corresponding number line is ....

-7 -6 -5 -4 -3 -2

(−3.4 or −4.3 or 3.4 or 4.3)

i) | −3.7 | = ... (3.7 or −3.7 or 37 or −73)

j) The absolute value of "zero" is .... (10 or 0 or −1 or 1)

Second: Complete the following:

ⓐ The integer that expresses (the temperature is 7 below zero) is ......-7.......

ⓑ The next number to "−1" is ....0.............

ⓒ The additive inverse of 11.5 is ....-11.5......

ⓓ The smallest positive integer is ....1..........

ⓔ The number and its opposite have the ....same.... distance from zero, but in two opposite directions on a number line.

ⓕ The rational number "−7.2" lies between the two integers ....-8......... and ....-7........

ⓖ The set of natural numbers is a subset of ....integer........ and a subset of rational numbers numbers.

ⓗ The rational number $-\frac{3}{2}$ in the decimal form is ...-1.5....

ⓘ If $|a| = 8$, then a = ...8...... or ....-8.....

ⓙ If $|5.6| = n$, then n = ...5.6...

Third:

1 Complete using (< , =, or >):

ⓐ -3.8 [<] -1.8

ⓑ $|-2.5|$ [<] $|-3.6|$

ⓒ $\left|\frac{2}{5}\right|$ [=] $|-0.4|$

ⓓ $-3\frac{7}{8}$ [<] $\left|-3\frac{5}{8}\right|$

2 Arrange the following numbers in a descending order:

$$0.55 \ , \ -\frac{3}{5} \ , \ \left|-\frac{1}{2}\right| \ , \ -\frac{1}{4} \ , \ |0.8|$$

$$|0.8| \ , \ 0.55 \ , \ \left|-\frac{1}{2}\right| \ , \ -\frac{1}{4} \ , \ -\frac{3}{5}$$

Accumulative Assessment on Units 1&2



First: **Choose the correct answer:**

a) The rational number represented on the corresponding number line is ....

-8 -7 -6 -5 -4 -3

($4\frac{2}{2}$ or $5\frac{2}{3}$ or $-4\frac{2}{3}$ or $-5\frac{2}{3}$)

b) 12 and .... are relatively prime numbers. (16 or 15 or 35 or 20)

c) The opposite of 6 > .... (−5 or 5 or −7 or 7)

d) $\frac{3}{5}$ ☐ $-\frac{5}{3}$ (> or = or < or ≥)

e) − 4 is to the right of .... on the number line. (−5 or 5 or −3 or 3)

Second: **Complete the following:**

a) The additive inverse of ......0...... is itself.

b) $-\frac{5}{4}$ = ...-1.25... (In the decimal form)

c) ...2... × (..8.. + ..6..) = (2 × 8) + (2 × 6)

d) ...42... is a number whose prime factors are 3, 2, 7.

e) $4\frac{1}{3} + 1\frac{1}{6} = 5\frac{1}{2}$

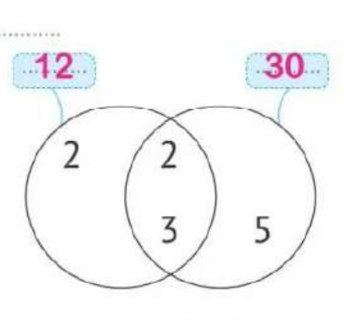
Third: **Answer the following:**

1 Find the results :

a) $3\frac{5}{8} + 4\frac{1}{6} = 3\frac{15}{24} + 4\frac{4}{24} = 7\frac{19}{24}$

b) $4\frac{1}{2} - 1\frac{3}{4} = 4\frac{2}{4} - 1\frac{3}{4} = 3\frac{6}{4} - 1\frac{3}{4} = 2\frac{3}{4}$

2 Complete the following using the opposite Venn diagram.



a) The two numbers are ...12... and ...30... .

b) The GCF is ...6... c) The LCM is ...60...

Unit 3 Algebraic Expressions

Concept 3.1 Use and Analyze Expressions

Lessons 1&2 Creating Mathematical Expressions / Analyzing Mathematical Expressions

1 Complete the following table:

	Algebraic Term	Coefficient	Variables
a	$-3\ a\ b$	-3	a , b
b	$5\ x$	5	x
c	$-3\ y$	-3	y
d	$\frac{1}{5} \times y$	$\frac{1}{5}$	x , y
e	$-\frac{2}{8}\ m$	$-\frac{2}{8}$	m
f	$8\ a\ b\ c$	8	a , b , c
g	$7\ r$	7	r
h	$5 \times y\ z$	5	x , y , z
i	$6\ n$	6	n
j	$\frac{3}{7}\ km$	$\frac{3}{7}$	k , m
k	$23\ a\ b$	23	a , b
l	$\frac{1}{6}\ y\ z$	$\frac{1}{6}$	y , z

2 Classify the following mathematical expressions into (numerical expressions or algebraic expressions) Put a tick (✓):

	Mathematical Expression	Numerical Expression	Algebraic Expression
a	$2 + 7.8$	✓	✗
b	$3(6) + 2$	✓	✗
c	$2n$	✗	✓
d	$\frac{1}{4}m - 2$	✗	✓
e	$r + s - t$	✗	✓
f	$4.5 + 56 + 2$	✓	✗
g	$5 + 3$	✓	✗
h	$5m + 3a - 2$	✗	✓
i	$5 \times 3 + 4 \times 3$	✓	✗
j	$q + 4$	✗	✓

3 Complete the following table:

	Mathematical Expression	Variable	Constant	Coefficients
a	$5a + 8$	a	8	5
b	$3a + 4b + 7$	a , b	7	3 , 4
c	$6x + 15 + 2.5$	x	15 , 2.5	6
d	$5y + 63$	y	63	5
e	$0.2m + 12 + 0.3h + 5$	m , h	12 , 5	0.2 , 0.3
f	$6w + 2 + 3 + 0.2$	w	2 , 3 , 0.2	6

4 Complete the following table:

	Mathematical Expression	Number of Terms	Like Terms
a	3.9	1	None
b	5a	1	None
c	$3x + 7x$	2	$3x$, $7x$
d	2 y + 7	2	None
e	$15 + 3 + x + y$	4	15 , 3
f	3 b + 5 b + 5 + 2 b	4	3b , 5b , 2b

5 Write a mathematical expression for each of the following situations:

a) Two numbers whose sum is 12, one of them is "d" so the other number is (12 – d)

b) Ahmed's age exceeds his brother Essam's by three years, so if Essam's age is "x" years then Ahmed's age is ($x + 3$)

c) If Ramez has $\frac{1}{5}$ of Emad has and if Emad has "w" pounds, then what Ramez has is ($\frac{1}{5}$ w)

d) If Hani has "x" pounds and he takes 10 pounds from his father, then Hani now has $x + 10$ pounds.

6 Choose the correct answer:

a In the algebraic term " $-3 \times y$", the coefficient is ....

(y or x or 3 or **−3**)

b In the algebraic term " $\frac{3}{8}$ a", the variable is .... (**a** or 8 or 3 or $\frac{3}{8}$)

c The number of terms that make up the algebraic expression

" $5x + 3y + 2$" is .... (2 or **3** or 5 or 6)

d The number of terms that make up the algebraic expression

" $8 + 3 \times y$" is .... (**2** or 3 or 4 or 5)

e Like terms for the algebraic expression " $5 + 5y + 2y$" are ....

(5 , 5 y or **5 y , 2 y** or 5 , 2 y or 5 , 5y , 2y)

f Like terms for the algebraic expression " $2 + 3b + 2a$" are ....

(2 , 3 b or 2 , 2 a or 3 b + 2 a or **none**)

g In the algebraic expression " $3y + 9$", the constant is ....

(**9** or 3 or y or 3 y)

h In the algebraic expression " $5a + 3b + 2 + 4$", the coefficients are

.... (2 , 4 or **5 , 3** or a , b or 5 , 3 , 2 , 4)

i If the height of the school building is "m" meters and the height of the tree adjacent to this building is 10 meters less than it, then the height of the tree is .... meters. (m + 10 or **m − 10** or 10 m or $\frac{m}{10}$)

Assessment on Lessons 1&2

Unit 3

1 Complete following:

ⓐ The variable in the term " $2.5\ x$ " is ...x... .

ⓑ The coefficient in the algebraic term $3 \times y$ is ...3... .

ⓒ The number of terms in the algebraic expression $3 \times y - 25$ is ...2... .

ⓓ Like terms in the algebraic expression $6\ x + 6\ y + 2\ x + 6$ are $6x$, $2x$.

ⓔ The constant in the algebraic expression $5\ b + 3.2$ is ...3.2... .

2 Choose the correct answer:

ⓐ Like terms in the algebraic expression $2\ a + 3\ a\ b + 3$ are ....

(2 a , 3 a b or 3 a b , 3 or 2 a , 3 or **none**)

ⓑ The coefficients in the algebraic expression "5 a + 3 b + 8 – 2.5" are ....

(**5 , 3** or 8 , 2.5 or 5 a , 3 b or 5 , 3 , 8 , 2.5)

ⓒ Ahmed and Tamer have 60 pounds, what if Ahmed has x pounds, then what Tamer has are .... pounds.($60 + x$ or **$60 - x$** or $60\ x$ or $60 \div x$)

ⓓ The number of terms of the algebraic expression $2.5\ x + 2\ x\ y - 4$ is.... .

(**3** or 4 or 5 or 6)

ⓔ Constants in the algebraic expression: $5\ a + \frac{2}{3} - 2\ b + 4$ are ....

(5 , 2 or **$\frac{2}{3}$, 4** or 5 , $\frac{2}{3}$ or 2 , 4)

3 Complete using the algebraic expression "$5\ x + 2y + 6\ x + 3$":

ⓐ The number of terms of an algebraic expression is ...4... .

ⓑ Like terms are $5x$, $6x$.

ⓒ Coefficients are 5 , 2 and 6.

ⓓ Constants are ...3... .

Lesson 3 Writing Algebraic Expressions

1 Express each of the following verbal forms using algebraic expressions:

a) Adding "z" to 36 ($z + 36$)

b) 5 less than "x" ($x - 5$)

c) 9 more than "a" ($a + 9$)

d) Three times of "b" ($3b$)

e) Product of "p" and 7.5 ($7.5\,P$)

f) Subtract 14 from "y" ($y - 14$)

g) Divide "h" by 6 ($h \div 6$)

h) 9 divided by "r" ($9 \div r$)

i) "a" increased by 3.5 ($a + 3.5$)

j) The sum of half "q" and 4 ($\frac{1}{2}q + 4$)

k) 7 subtracted from twice "w" ($2w - 7$)

l) Double of "v" minus 3 ($2v - 3$)

m) Twice the sum of "g" and 6 ($2 \times (g + 6)$)

n) Three times the difference between "s" and 2 ($3 \times (s - 2)$)

o) The sum of three times "a" and 5 ($3a + 5$)

p) Ammar has "x" coins, Tamer has 7 more than Ammar. ($x + 7$)

q) Baher has "m" stickers in the sticker book and then puts up to 12 more stickers. ($m + 12$)

r) A student shared an orange equally with 2 of his friends. ($x \div 3$)

2 Write each of these algebraic expressions using the verbal form:

a) $a + 9$: 9 more than a

b) $b - 6$: 6 less than b

c) $7.5 - f$: f less than 7.5

d) $12y$: 12 multiplied by y

e) $8 \div s$: 8 divided by s

f) $K \div r$: K divided by r

g) $3x + 6$: add 6 to 3 times x

h) $7 - 2x$: 2 times x less than 7

i) $\frac{1}{2}(m + 3)$: half the sum of m and 3

j) $5(c - 3)$: 5 times the difference between 3 and c

3 Match each verbal expression with the appropriate algebraic expression:

a) Twice the sum of "a" and 4 — 2 (a + 4) 3

b) The sum of twice of "a" and 4 — 2 a + 4 1

c) The sum of "a" and 4 — a + 4 4

d) Product of "a" by 4 — 4 a 2

Verbal expression	Algebraic expression
a) Twice the sum of "a" and 4	$2a + 4$ 1
b) The sum of twice of "a" and 4	$4a$ 2
c) The sum of "a" and 4	$2(a + 4)$ 3
d) Product of "a" by 4	$a + 4$ 4

4 Choose the correct answer:

a) If we subtract 5 from the number "x", the result is ....



($x + 5$ or **$x - 5$** or $5 - x$ or $5x$)

b) Ziyad saved "x" pounds and his father gave him 10 pounds, so that he would have ....

($x - 10$ or **$x + 10$** or $10x$ or $10 - x$)

c) The algebraic expression representing (subtract 3 from twice the number "x") is ....

($x - 3$ or **$2x - 3$** or $3x + 2$ or $5x$)

d) The algebraic expression representing (the difference between three times the number "y" and 2) is ....

(**$3y - 2$** or $2y - 3$ or $3 \times 2x$ or $\frac{3x}{2}$)

e) The algebraic expression that represents (three times the sum of the number "m" and 12) is ....

($3m + 12$ or **$3(m + 12)$** or $12m + 3$ or $12(m + 3)$)

f) The algebraic expression representing (half the difference between the number "a" and 7) is ....

($\frac{1}{2}a - 7$ or $\frac{1}{2}a - 7$ or **$\frac{1}{2}(a - 7)$** or $\frac{1}{2}(a + 7)$)

g) If Basim is "x" years old now, how old will he be after 5 years? ....

($x - 5$ or **$x + 5$** or $5 \div x$, or $5x$)

h) Which of the following operations expresses the mathematical expression (double the number plus 4) ....

(+, − or ×, − or **×, +** or ×, ÷)

Assessment on Lesson 3

Unit 3

1 Complete the following:

ⓐ The verbal form for the algebraic expression $\frac{a}{5} + 3$ is

.... The sum of 3 and the fifth of a ....

ⓑ The verbal form for the algebraic expression 6 m is

.... Multiply m by 6 ....

ⓒ The algebraic expression for the verbal form "three times b" is ..... 3b ..... .

ⓓ Ahmed is now "y" years old. How old was he 3 years ago? ..... y – 3 ..... .

ⓔ Ahmed shared a pizza pie equally with 4 of his friends, each of whom had their share of the pizza is (..... p ÷ 4 .....).

2 Choose the correct answer:

ⓐ The number "m" plus 18 and the result divided by 3 = ...

(3 ÷ (m + 18) or **(m + 18) ÷ 3** or $\frac{m}{3}$ + 18 or m + $\frac{18}{3}$)

ⓑ If "b" is an integer, then the integer next to it is ....

(**b + 1** or b – 1 or 2 b or $\frac{b}{2}$)

ⓒ A square of side length "s" cm has a perimeter of .... cm.

(s + 4 or s – 4 or $\frac{s}{4}$ or **4 s**)

ⓓ Two numbers whose sum is 35 and one of them is "w", then the other number is ....

(w + 35 or w – 35 or **35 – w** or 35 w)

ⓔ The price of a kilogram of meat increased by 120 pounds. If its price becomes "x" after the increase, then its price before the increment is ....

(x + 120 or **x – 120** or 12 – x or 120 x)

3 Bassem runs one kilometer in 15 minutes.

Write a mathematical expression that expresses the time Bassem needs to run "t" km.

.... 15 t ....

Concept 3.2 Algebraic Expressions and Exponents

Lesson 4 Ordering of Operations and Exponents

1 **Complete the following:**

ⓐ $5 \times 5 \times 5 \times 5 = 5^{4}$

ⓑ $4 \times 4 \times 4 = 4^{3}$

ⓒ $3 \times 3 \times 3 \times 3 \times 3 = 3^{5}$

ⓓ $8 \times 8 \times 8 = 8^{3}$

ⓔ $2 \times 2 \times 2 \times 2 = 2^{4}$

ⓕ $6 \times 6 \times 6 = 6^{3}$

ⓖ $7^2 = 7 \times 7$

ⓗ $6^4 = 6 \times 6 \times 6 \times 6$

ⓘ $10^2 = 10 \times 10$

ⓙ $1^5 = 1 \times 1 \times 1 \times 1 \times 1$

ⓚ $5^3 = 5 \times 5 \times 5$

ⓛ $2^2 = 2 \times 2$

2 **Find the value:**

ⓐ $5^2 = 25$

ⓑ $3^3 = 27$

ⓒ $2^5 = 32$

ⓓ $1^4 = 1$

ⓔ $1^3 = 1$

ⓕ $10^3 = 1{,}000$

ⓖ $0^2 = 0$

ⓗ $0^3 = 0$

ⓘ $1^8 = 1$

ⓙ $1^{10} = 1$

ⓚ $6^0 = 1$

ⓛ $9^0 = 1$

3 **Follow the order of performing operations, then find the value of each of the following:**

ⓐ $4 + 5 \times 6$ $= 4 + 30$ $= 34$	ⓑ $18 - 12 \div 3$ $= 18 - 4$ $= 14$	ⓒ $15 \div 3 + 7$ $= 5 + 7$ $= 12$
ⓓ $7 \times 7 - 24$ $= 49 - 24$ $= 25$	ⓔ $9 + 9 - 8$ $= 18 - 8$ $= 10$	ⓕ $15 - 3 + 7$ $= 12 + 7$ $= 19$
ⓖ $6 \times 6 \div 4$ $= 36 \div 4$ $= 9$	ⓗ $48 \div 8 \times 2$ $= 6 \times 2$ $= 12$	ⓘ $5 \times 2 + 3 \times 4$ $= 10 + 12$ $= 22$

4 Follow the order of performing operations, then find the value of each of the following:

a) $(3 + 6) \times 2$
= 9 X 2
= 18

b) $15 \div (2 + 3)$
= 15 ÷ 5
= 3

c) $8 \times (12 \div 4)$
= 8 X 3
= 24

d) $[3 \times (9 - 4)] - 10$
= [3 X 5] – 10
= 15 – 10
= 5

e) $5 \times [12 \div (4 + 2)]$
= 5 X [12 ÷ 6]
= 5 X 2
= 10

5 Follow the order of performing operations, then find the value of each of the following:

a) $4^2 + 2 \times 3$
= 16 + 2 X 3
= 16 + 6 = 22

b) $2^4 - 3^2$
= 16 – 9
= 7

c) $10^2 \div 5$
= 100 ÷ 5
= 20

d) $45 - 6^2$
= 45 – 36
= 9

e) 3×1^3
= 3 X 1
= 3

f) $48 \div 4^2$
= 48 ÷ 16
= 3

g) $3 \times 2^3 \div 12$
= 3 X 8 ÷ 12
= 24 ÷ 12
= 2

h) $8 + 5^2 - 30$
= 8 + 25 – 30
= 33 – 30
= 3

i) $2 \times 10^2 + 15$
= 2 X 100 + 15
= 200 + 15
= 215

j $2^2 \times 3 - 10$

= 4 X 3 – 10

= 12 – 10

= 2

k $6^2 \div 9 + 5$

= 36 ÷ 9 + 5

= 4 + 5

= 9

l $4^3 + 2 \times 5$

= 64 + 2 X 5

= 64 + 10

= 74

6 **Follow the order of performing operations, then find the value of each of the following:**

a $4^2 + (15 - 7) \times 2$

= 16 + (15 – 7) X 2

= 16 + 8 X 2

= 16 + 16 = 32

b $(2^5 + 3) \div (2^3 - 1)$

= (32 + 3) ÷ (8 – 1)

= 35 ÷ 7

= 5

c $3 \times [5^2 - (4 \times 6)]$

= 3 X [25 – (4 X 6)]

= 3 X [25 – 24]

= 3 X 1 = 3

d $[5^2 \times (6^2 \div 9)] - 24$

= [25 X (36 ÷ 9)] – 24

= [25 X 4] – 24

= 100 – 24 = 76

7 **Complete the following:**

a In 5^7, 5 is called base and 7 is called exponent (power)

b In 4^2 : 4 is called the base and 2 is called the exponent.

c Six cubed = 6^3

d Seven squared = 7^2

e Four to the power 5 = 4^5

f ....6.... to the power ....4.... $= 6^4$

g If $3^x = 81$, then the value of x is ....4.... .

h If $y^3 = 64$, then the value of y is ....4.... .

8 Choose the correct answer:

a $4^2 =$ .... (4×2 or [4×4] or $4 + 2$ or $4 + 4$)

b $3^0 =$ .... (3 or 0 or [1] or 3×0)

c $1^5 =$ .... (1×5 or $1 + 5$ or [1] or 0)

d $2 \times 2 \times 2 \times 2 \times 2 =$ .... ([2^5] or 5^2 or 2×5 or $2 + 5$)

e $5 \times 5 \times 5 =$ .... (3^5 or [5^3] or $5 + 3$ or $5 X 3$)

f $4^{.......} = 1$ ([0] or 1 or 2 or 5)

g $5^{.......} = 5$ (0 or [1] or 2 or 5)

h $3^4 =$ .... ($4 \times 4 \times 4$ or [$3 \times 3 \times 3 \times 3$] or 3×4 or $3 + 4$)

i 2^4 ☐ 4^2 (< or [=] or > or ⩾)

j 3^2 ☐ 2^3 (< or = or [>] or ⩾)

k $5 \times 3 + 2^2 =$ .... (35 or [19] or 51 or 17)

l $2^3 \times (5^2 + 75) =$ .... ([800] or 275 or 210 or 135)

m $3^2 + 3^2 + 3^2 =$ .... (3^6 or 9^2 or [3^3] or 9^6)

Assessment on Lesson 4

Unit 3

1 Choose the correct answer:

a $3^2 =$ .... (3 + 3 or 2 + 2 + 2 or 3 × 3 or 3 × 2)

b $3^{\dots} = 3$ (0 or 1 or 3 or 10)

c 4^2 ☐ 2^4 (< or = or > or ≤)

d $5^2 + 2^2 \times 10^2 =$ .... (425 or 2,900 or 129 or 410)

e $(3^3 - 3^2) \div 3^2 =$ .... (26 or 9 or 0.5 or 2)

2 Complete the following:

a $5^{0} = 1$

b $7^{1} = 7$

c $2^{3} = 8$

d $3 \times 3 \times 3 \times 3 \times 3 = 3^{5}$

e $6^2 \div 3^2 \times 2 =$ 8

3 Follow the order of performing operations, then find the value of each of the following:

a $(15 - 9) + 3 \times 4^2 \div 2$

= 6 + 3 X 16 ÷ 2

= 6 + 48 ÷ 2

= 6 + 24 = 30

b $8 + 2 \times (6 - 2) \div 2^3$

= 8 + 2 X 4 ÷ 8

= 8 + 8 ÷ 8

= 8 + 1 = 9

c $[3^2 \times (8 - 5)] \div 3$

= [9 X 3] ÷ 3

= 27 ÷ 3

= 9

d $5^2 + (48 \div 2^3) - 15$

= 25 + (48 ÷ 8) – 15

= 25 + 6 – 15

= 31 – 15 = 16

Lessons 5-7

Evaluating Algebraic Expressions
Applications on Algebraic Expressions
Determining Equivalent Algebraic Expressions

1 **Write the algebraic expression that represents each of the following situations:**

a) If the price of one pen is 8 pounds, what is the price of "x" pens?

($8x$)

b) If the price of a juice can is 12 pounds, what is the price of "y" juice cans?

($12y$)

c) Salah saves "z" pounds per day. How much does he save in a week?

($7z$)

d) A restaurant provides meals, the price of one meal is 50 pounds, and 15 pounds are added to the home delivery service, regardless of the number of meals required.

What is the total amount paid when ordering "m" meals?

($50m + 15$)

e) Hussam is training for "n" hours daily for 6 days of the week, and on Friday he is training for 3 hours. How many hours does Hossam spend training in one week? $6n + 3$

f) Wafaa has 300 pounds. She bought 9 pens of the same type. The price of one pen is "p" pounds. What is the amount left with Wafaa after buying the pens? $300 - 9p$

g) Hana has 3 boxes of pens, each with "q" pens, and she wants to divide these pens among 6 children.

How many pens will each child get? $3q \div 6$

2 Find the value of the algebraic expression in each of the following:

ⓐ $6x + 15$ [for $x = 3$]

= $6 \times 3 + 15$

= $18 + 15$

= 33

ⓑ $25 - 3y$ [for $y = 8$]

= $25 - 3 \times 8$

= $25 - 24$

= 1

ⓒ $9z - 15$ [for $z = 2.1$]

= $9 \times 2.1 - 15$

= $18.9 - 15$

= 3.9

ⓓ $4a - 15 \div 3$ [for $a = 2.5$]

= $4 \times 2.5 - 15 \div 3$

= $10 - 15 \div 3$

= $10 - 5 = 5$

ⓔ $(6b - 3) \div 7$ [for $b = 4$]

= $(6 \times 4 - 3) \div 7$

= $(24 - 3) \div 7$

= $21 \div 7 = 3$

ⓕ $18 \div (9 - 2c)$ [for $c = 1.5$]

= $18 \div (9 - 2 \times 1.5)$

= $18 \div (9 - 3)$

= $18 \div 6 = 3$

3 Find the value of the algebraic expression in each of the following:

ⓐ $d^3 + 7$ [for $d = 3$]

= $3^3 + 7$

= $27 + 7$

= 34

ⓑ $37 - 4^e$ [for $e = 2$]

= $37 - 4^2$

= $37 - 16$

= 21

ⓒ $f^5 - 21$ [for $f = 2$]

= $2^5 - 21$

= $32 - 21$

= 11

ⓓ $g^2 - 32 \div 8$ [for $g = 5$]

= $5^2 - 32 \div 8$

= $25 - 32 \div 8$

= $25 - 4 = 21$

e) $(h^2 - 1) \div 5$ [for h = 6]
= $(6^2 - 1) \div 5$
= $(36 - 1) \div 5$
= $35 \div 5 = 7$

f) $16 \div (20 - n^2)$ [for n = 4]
= $16 \div (20 - 4^2)$
= $16 \div (20 - 16)$
= $16 \div 4 = 4$

g) $m^2 + m^3 - 15$ [for m = 3]
= $3^2 + 3^3 - 15$
= $9 + 27 - 15$
= $36 - 15 = 21$

h) $k^2 \times (k - 5)$ [for k = 5]
= $5^2 \times (5 - 5)$
= 25×0
= 0

4 Find the value of the algebraic expression in each of the following:

a) $15 + 3x - x^2$ [for $x = 4$]
= $15 + 3 \times 4 - 4^2$
= $15 + 12 - 16$
= $27 - 16 = 11$

b) $y^3 - 5y \div 3$ [for y = 3]
= $3^3 - 5 \times 3 \div 3$
= $27 - 15 \div 3$
= $27 - 5 = 22$

c) $6a \div (a^2 - 10)$ [for a = 5]
= $6 \times 5 \div (5^2 - 10)$
= $30 \div (25 - 10)$
= $30 \div 15 = 2$

d) $3b + 6 \times (b^2 - 3)$ [for b = 2]
= $3 \times 2 + 6 \times (2^2 - 3)$
= $6 + 6 \times (4 - 3)$
= $6 + 6 \times 1 = 6 + 6 = 12$

5 In a car park, 10 pounds are collected for parking the car for the first hour, and 5 pounds are added for every hour after the first hour.

a) Write an algebraic expression that expresses the amount collected for parking the car for "h" hours after the first hour. ($10 + 5h$)

b) If the number of hours the car waited for is 6 hours, what is the value of the amount collected for parking the car? $10 + 5 \times 5 = 10 + 25 = 35$ pounds

6 **Hala receives a daily wage of "p" pounds. If her expenses in 10 days amounted to 325 pounds.**

a) Write an algebraic expression for the amount remaining with her in the 10 days. (10p – 325)

b) If Hala's wages are 50 Egyptian pounds per day, how much money is left with her? 10 X 50 – 325 = 500 - 325 = 175 pounds

7 **Evaluate each of these algebraic expressions using two positive integers of your choice. If the algebraic expressions are equal, answer yes. If algebraic expressions are not equal, answer no.**

a	$x + 3x$	$3(x + 1)$	Equal or Not?
If x = 1	1 + 3 X 1 = 1 + 3 =4	3 X (1 + 1) = 3 X 2 = 6	Not equal
If x = 2	2 + 3 X 2 = 2 + 6 = 8	3 X (2 +1) = 3 X 3 = 9	Not equal

From the previous table, we find that: The two algebraic expressions are .... (equivalent or not equivalent).

b	$5x + 5$	$5(x + 1)$	Equal or Not?
If x = 1	5 X 1 + 5 = 5 + 5 = 10	5 X (1 +1) = 5 X 2 = 10	equal
If x = 2	5 X 2 + 5 = 10 + 5= 15	5 X(2 +1) = 5 X 3 = 15	equal

From the previous table, we find that: The two algebraic expressions are .... (equivalent or not equivalent).

Assessment on Lessons 5-7

Unit 3

1 Choose the correct answer:

ⓐ If the price of one shirt is 120 Egyptian pounds, then the price of "m" number of shirts is ....

(120 m or 120 ÷ m or 120 + m or 120 – m)

ⓑ If Hanan saves "d" pound daily for 5 days, then her father gives her 20 pounds, then the amount that Hanan has now is ....

(5 + 20d or 20 – 5d or 5d + 20 or 5 × (d + 20))

ⓒ The value of the expression $a^2 + 2 \times 3$ when a = 3 is ....

(15 or 33 or 12 or 24)

ⓓ The value of the expression 12 ÷ (16 – 3b) when b = 4 is ....

(4 or 3 or 26 or 10)

ⓔ Which of the following order of operations is used to find the value of the expression $8 + 2 \times (n^2 - 3)$, when n = 5

(Putting the exponent in its simplest form, subtraction, multiplication, addition

or Addition, multiplication, exponentiation in simplest form, subtraction

or Putting the exponent in its simplest form, addition, subtraction, multiplication

or Putting the exponent in its simplest form, multiplication, addition, subtraction)

2 Complete the following:

ⓐ If the side length of a square is "s" cm, then the perimeter of the square

= ......4s......

ⓑ The value of the expression $9x$ (when $x = 5$) is ......45......

ⓒ The value of the expression r^2 (when $r = 9$) is ......81......

ⓓ The algebraic expressions "$2x + 3$" and "$2(x + 1)$ are expressions of

......not equal...... (equal, not equal)

ⓔ The value of the expression $3 \times (y^2 - 5)$ (when $y = 3$) is ......12...... .

3 Fouad studies for "k" hours a day for 5 days, then studies for 6 hours on the sixth day.

ⓐ Write an algebraic expression for the number of hours he studies in

the 6 days. (......5K + 6......)

ⓑ If the number of hours he studies in each of the five days is 4 hours.

How many hours did he study in the 6 days?

......5 X 4 + 6 = 20 + 6 = 26 hours...... .

Assessment on Unit 3

First: **Choose the correct answer:**

ⓐ The coefficient of the algebraic term "-3 ab" is ....

(-3 or 3 or a or ab)

ⓑ The number of terms that makes up the algebraic expression "$3xy + 2x - 5$" is .... term. (2 or 3 or 4 or 5)

ⓒ The constant term in "$3m + 2$" is .... (2 or 3 or m or 3 m)

ⓓ Subtracting the number 3 from twice the number y = ...

($3 - 2y$ or $2(y - 3)$ or $3y - 2$ or $2y - 3$)

ⓔ Samah is now 25 years old. How old was she h years ago?

($25 - h$ or $h - 25$ or $25 - h$ or 25h)

ⓕ $5 \times 5 \times 5 =$ .... (5×3 or 5^3 or 3^5 or $5 + 3$)

ⓖ $3^2 + 4$ ☐ $9 + 2^2$ (> or = or < or ≤)

ⓗ If the price of one book is 15 pounds, what is the price of b number of books? (15 b or $15 - b$ or $b - 15$ or $b + 15$)

ⓘ The value of $(12 - x^3) \div 2$ if $x = 2$ is .... (8 or 10 or 2 or 6)

ⓙ The order that is used to find the value of $2 + 3(m^2 - 5)$ if m = 3 is ....

(putting exponents in their simplest form, subtraction, multiplication, addition

or addition, exponents, subtraction, multiplication

or putting the exponents in the simplest form, addition, subtraction, multiplication

or multiplication, addition, exponents in simplest form, subtraction)

Second: **Complete the following:**

ⓐ If the sum of two integers is S and one of them is 10, then the other number is ..**s – 10**.. .

ⓑ In $7xy$, the coefficient is ....**7**.... .

ⓒ Like terms for "$3n + 3 + 2n$" are ..**3n , 2n**.. .

ⓓ Twice of subtracting 5 from the number w = $2(w - 5)$.

ⓔ The verbal form for "$3x - 5$" is subtract 5 from 3 times x .

ⓕ Ahmed's car consumes "n" liters of fuel to travel a distance of 100 km. How many liters does the car need to travel a distance of 600 km? 6n .

ⓖ The value of "$4 \times (y^3 - 7)$" for y = 3 is $4 \times (3^3 - 7) = 80$

ⓗ $3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^{6}$

ⓘ $5^{0} = 1$ ⓙ $4^{1} = 4$

Third: Answer the following:

1. Moataz saved "n" pounds per day for 9 days, then he got 20 pounds from his father.

   ⓐ Write an algebraic expression that expresses the amount that Moataz has now: $9n + 20$

   ⓑ Complete using the preceding algebraic expression:

   ① The number of terms of an algebraic expression is 2 .

   ② The coefficients are 9 .

   ③ The constants are 20 .

2. Find the value of each of the following two algebraic expressions using the numbers shown, then indicate if these expressions are equivalent or not :

	$2x + 1$	$5x - 4$	Equal or Not?
If $x = 5$	$2 \times 5 + 1 = 10 + 1 = 11$	$5 \times 5 - 4 = 25 - 4 = 21$	Not equal
If $x = 3$	$2 \times 3 + 1 = 6 + 1 = 7$	$5 \times 3 - 4 = 15 - 4 = 11$	Not equal

From the previous table, we find that the two algebraic expressions are .... (Equivalent or [Not]).

Accumulative Assessment on Units 1–3



First: **Choose the correct answer:**

(a) The coefficient of the algebraic term "$\frac{3}{4}x$" is .... (3 or 4 or $\frac{3}{4}$ or x)

(b) If we subtract 9 from the number x, the result is ....

($x + 9$ or $x - 9$ or $9 - x$ or $9x$)

(c) $| -3.7 | =$ .... (3.7 or −3.7 or 37 or −37)

(d) $2 \times 2 \times 2 =$ .... (2^3 or 3^2 or 2×3 or $2 + 3$)

(e) $2^3 + 2^3 =$ .... (2^6 or 4^3 or 2^4 or 4^6)

Second: **Complete the following:**

(a) ....2.... is the smallest prime number.

(b) The smallest positive integer is ....1.... .

(c) The number of terms in the algebraic expression 5y – 25 z is ....2.... .

(d) If the price of a pen is 8 LE then the price of x pens is ....$8x$.... .

(e) The verbal form for the algebraic expression 3b + 4 is ....

....add 4 to 3 times b....

Third: **Answer the following:**

1 Follow the order of performing operations to find:

(a) $4^2 + (2^4 - 7) \times 2$

$= 16 + (16 - 7) \times 2$

$= 16 + 9 \times 2$

$= 16 + 18 = 34$

(b) $(2^3 + 6) \div (3^2 - 2)$

$= (8 + 6) \div (9 - 2)$

$= 14 \div 7$

$= 2$

2 Wael collected $3\frac{3}{4}$ kilograms of dates and gave $2\frac{1}{5}$ kilograms to his friend.

How many kilograms are left with Wael?

the left $= 3\frac{3}{4} - 2\frac{1}{5} = 3\frac{15}{20} - 2\frac{4}{20} = 1\frac{11}{20}$ Kg

Unit 4 Equations and Inequalities

Concept 4.1 Write and Solve Equations and Inequalities

Lesson 1 Solving Algebraic Equations

1 Write the equation that represents each of the following models, and then find the value of "x":

a



Equation: $x + 2 = 12$

x = $12 - 2 = 10$

b



Equation: $x + 1 = 7$

x = $7 - 1 = 6$

c



Equation: $3x = 12$

x = $12 \div 3 = 4$

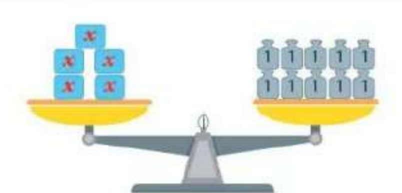
d



Equation: $2x = 12$

x = $12 \div 2 = 6$

e



Equation: $5x = 10$

x = $10 \div 5 = 2$

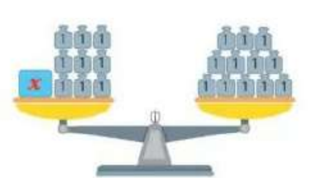
f



Equation: $x + 6 = 9$

x = $9 - 6 = 3$

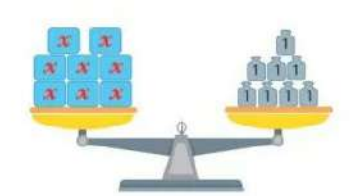
g



Equation: $x + 9 = 12$

x = $12 - 9 = 3$

h



Equation: $8x = 8$

x = $8 \div 8 = 1$

2 **Find the value of the variable in each of the following equations (solve the equation):**

a) $x + 9 = 12$ $x = 12 - 9$ $x = 3$	b) $y + 6 = 11$ $y = 11 - 6$ $y = 5$
c) $3 + b = 5$ $b = 5 - 3$ $b = 2$	d) $a - 6 = 8$ $a = 8 + 6$ $a = 14$
e) $6m = 24$ $m = 24 \div 6$ $m = 4$	f) $3n = 21$ $n = 21 \div 3$ $n = 7$
g) $\frac{s}{4} = 3$ $s = 4 \times 3$ $s = 12$	h) $\frac{1}{5}t = 4$ $t = 4 \times 5$ $t = 20$

3 **Complete the following:**

a) If $x + 3 = 8$, then $x =$ ....5.... .

b) If $y - 2 = 9$, then $y =$ ....11.... .

c) If $8m = 16$, then $m =$ ....2.... .

d) If $\frac{1}{3}n = 3$, then $n =$ ....9.... .

e) If $a = 3$, then $a +$ ..4.. $= 7$.

f) If $b = 5$, then $b -$ ..3.. $= 2$.

g) If $d = 4$, then ..5.. $\times d = 20$.

h) If $k = 12$, then $K \div$ ..3.. $= 4$.

Assessment on Lesson 1

Unit 4

1 **Choose the correct answer:**

ⓐ If $a + 8 = 15$, then $a =$ .... (7 or 15 or 8 or 23)

ⓑ If $b = 6$, then $b -$ ...... $= 4$. (10 or 4 or 2 or 6)

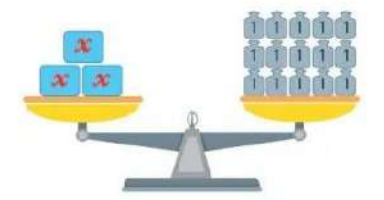
ⓒ If $6x = 42$, then $x =$ .... (38 or 42 or 7 or 48)

ⓓ If $y = 27$, then $\frac{y}{\dots} = 9$. (18 or 3 or 27 or 9)

ⓔ If $4n = 12$, then $6n =$ .... (4 or 12 or 18 or 3)

2 **Write the equation that represents each of the following models, and then find the value of "x":**

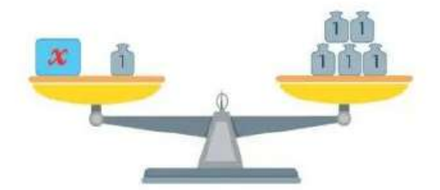
ⓐ



Equation: $3x = 15$

$x = 15 \div 3 = 5$

ⓑ



Equation: $x + 1 = 5$

$x = 5 - 1 = 4$

3 **Find the value of the variable in each of the following equations (solve the equation):**

ⓐ $x + 2 = 7$

$x = 7 - 2$

$x = 5$

ⓑ $y - 3 = 8$

$y = 8 + 3$

$y = 11$

ⓒ $3a = 21$

$a = 21 \div 3$

$a = 7$

ⓓ $\frac{n}{5} = 35$

$n = 5 \times 35$

$n = 175$

Theme 1

Lessons 2&3 Exploring Inequalities Solving Inequalities

1 **The sign shows the height limits for an amusement park ride.**



ⓐ List three acceptable heights for a person to be able to ride the roller coaster.

...110 cm... , ...112 cm... , ...116 cm... .

ⓑ List three unacceptable heights for a person to be not able to ride the roller coaster.

...100 cm... , ...120 cm... , ...130 cm... .

2 **The sign shows the weight limits for vehicles stowed (stored) on a ramp and vehicles transiting (traveling across) the ramp. Answer these questions.**

CAUTION

Weight Restrictions

The total weight of vehicles stowed on the ramp shall not exceed 47,000 kg (104,000 lb)

Vehicles transiting on the ramp shall not exceed 24,500 kg (54,000 lbs)

Weight Limit

ⓐ Suppose 3 vehicles are stowed on the ramp at the same time.

What are some possible weights of the 3 vehicles?

...45,000 Kg... , ...46,000 Kg... , ...47,000 Kg... .

ⓑ Now, suppose 3 vehicles are traveling across the bridge.

What are some possible weights of the 3 vehicles?

...23,000 Kg... , ...24,000 Kg... , ...24,500 Kg... .

3 **Write the inequality that represents each of the following expressions:**

a) All values greater than –1: $x > -1$

b) All values less than 2: $x < 2$

c) All values to the right of –9 on the number line are: $x > -9$

d) All values to the left of the number 2 on the number line are: $x < 2$

e) All values greater than or equal to 6: $x \geq 6$

f) All values less than or equal to –8: $x \leq -8$

g) Negative integers: $x < 0$ or $x \leq -1$

h) Positive integers: $x > 0$ or $x \geq 1$

i) Natural numbers: $x > -1$ or $x \geq 0$

j) Counting numbers: $x > 0$ or $x \geq 1$

k) Non-negative integers: $x > -1$ or $x \geq 0$

l) Non-positive integers: $x < 1$ or $x \leq 0$

4 **Write what each of the following inequalities represents:**

a) $x > 9$ → All values greater than 9

b) $x > -5$ → All values greater than -5

c) $x < 2$ → All values Less than 2

d) $x < -7$ → All values Less than -7

e) $x \leqslant -3$ → All values Less than or equal -3

f) $x \leqslant 4$ → All values Less than or equal 4

g) $x \geqslant 3$ → All values greater than or equal 3

h) $x \geqslant 0$ → All values greater than or equal 0

5 Determine whether each of the given values is a solution to $x < 9$. Record all the values that are solutions:

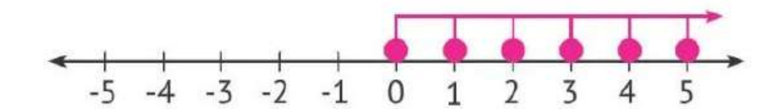
a – 9	b 10	c 0
d 2.4	e 9.1	f – 0.9
g 8.9	h – 6	i 15

6 Name 3 solutions of each inequality in the set of integers.

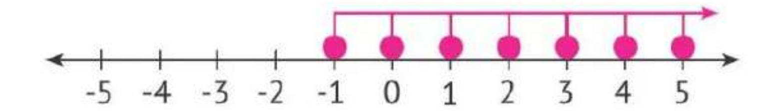
a $x < 3$ 0 , 1 , 2	b $x \geqslant 1$ 1 , 2 , 3	c $2x < 5$ 2 , 1 , 0
d $x + 1 < 5$ 3 , 2 , 1	e $3x \leqslant 12$ 4 , 3 , 2	f $x - 2 < 7$ 8 , 7 , 6

7 Use the number line to represent each of the following inequalities in the set of integers:

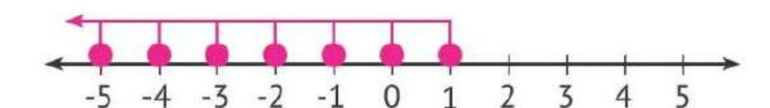
a $x > -1$



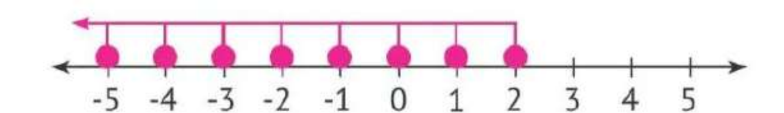
b $x \geqslant -1$



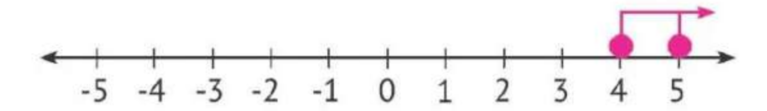
c $x < 2$



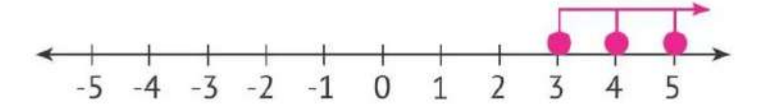




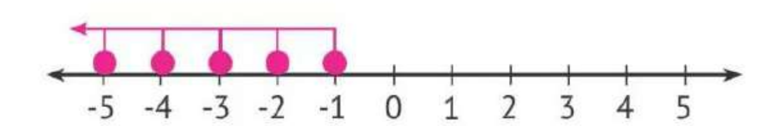
e $x > 3$



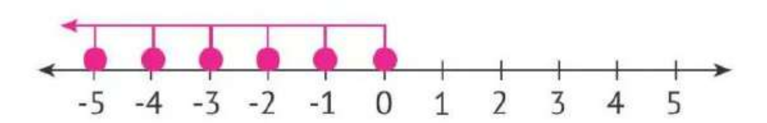
f $x \geqslant 3$



g $x < 0$



h $x \leqslant 0$



8 Choose the correct answer:

a The inequality that represents all values greater than -1 is .... (**$x > -1$** or $x < -1$ or $x \leqslant -1$ or $x \geqslant -1$)

b The inequality that represents all values to the left of 5 on a number line is .... ($x > 5$ or **$x < 5$** or $x \leqslant 5$ or $x \geqslant 5$)

c The inequality that represents all values less than or equal to -7 is .... ($x > -7$ or $x < -7$ or **$x \leqslant -7$** or $x \geqslant -7$)

d The inequality that represents all the values to the right of 3 on the number line is .... (**$x > 3$** or $x < 3$ or $x \leqslant 3$ or $x \geqslant 3$)

e The inequality that represents negative integers are ....

($x > 0$ or **$x < 0$** or $x \leqslant 0$ or $x \geqslant 0$)

f The inequality that represents non-positive integers ....

($x > 0$ or $x < 0$ or $x \leqslant 0$ or $x \geqslant 0$)

g The graph of the inequalities $x > 3$ and $x < 3$ on a number line is similar in ....
(3 does not belong to the solution set in each of them
or both include all values to the left of 3
or there is a common point between them
or each of them includes all the values to the right of 3)

h The graph of the inequalities $x < 4$ and $x \leqslant 4$ on a number line are similar in ....
(4 does not belong to the solution set in each of them
or each including all values to the left of 4
or there is a common point between them
or each of them includes all the values to the right of the number 4)

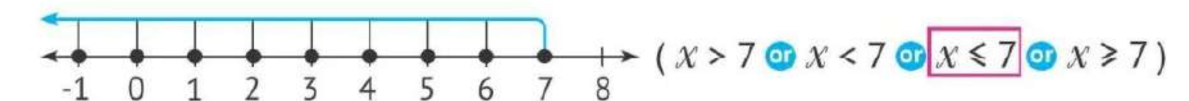
i Which of the following values is a solution to the inequality $x < 9$?

(10 or 9.1 or –9.5 or 9)

j Which of the following values is a solution to the inequality $x \geqslant 5$?

(–5 or 4.59 or –25 or 6)

k The inequality represented by the corresponding graph is: ....



($x > 7$ or $x < 7$ or $x \leqslant 7$ or $x \geqslant 7$)

9 **How similar are the graphs of the following pair of algebraic expressions? And what is the difference:**

a $x < -8$, $x \leqslant -8$

① The similarity

both of them include numbers to the left of –8 on the number line.

② The differences

–8 does not belong to the solution set of the inequality " x < –8" and –8 belongs to the solution set of the inequality " x ≤ –8" b.

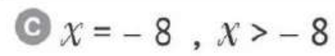
ⓑ $x \geqslant -8$, $x \leqslant -8$

① The similarity

–8 belongs to the solution set of the inequality of any of them.

② The differences

$x \geq -8$ has all numbers to the right of –8 and $x \leq -8$ has all numbers to the left of –8.



ⓒ $x = -8$, $x > -8$

① The similarity

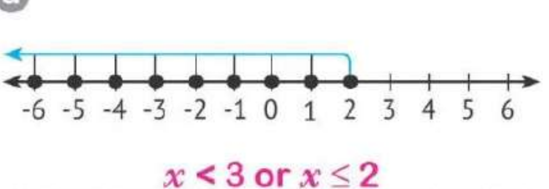
None

② The differences

–8 is the solution of " $x = -8$" and –8 does not belong to the solution set of the inequality " $x < -8$".

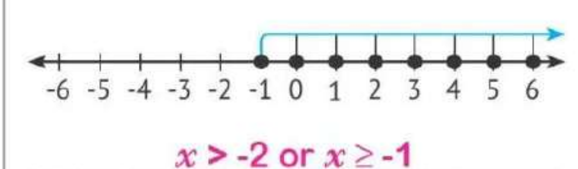
10 **Write the inequality represented by each of the following number lines in the set of integers:**

ⓐ



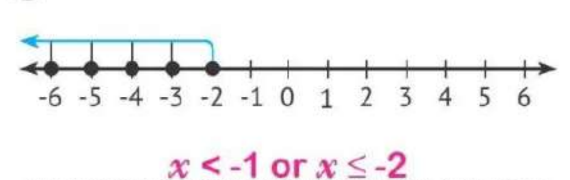
$x < 3$ or $x \leq 2$

ⓑ



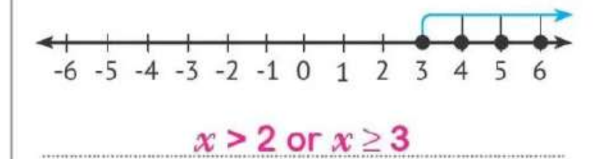
$x > -2$ or $x \geq -1$

ⓒ



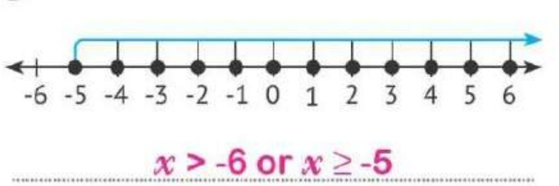
$x < -1$ or $x \leq -2$

ⓓ



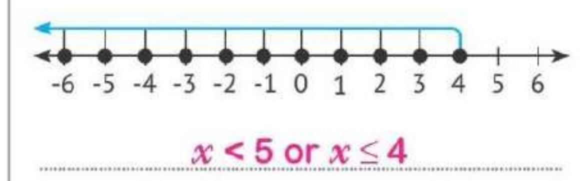
$x > 2$ or $x \geq 3$

ⓔ



$x > -6$ or $x \geq -5$

ⓕ



$x < 5$ or $x \leq 4$

Assessment on Lessons 2&3

Unit 4

1 Choose the correct answer:

ⓐ The inequality representing the statement "All values greater than –5 are .... ([$x > -5$] or $x < -5$ or $x \leqslant -5$ or $x \geqslant -5$)

ⓑ The statement that represents the inequality $x < 3$ is: All values .... 3 (greater than or [less than] or greater than or equal to, less than or equal to)

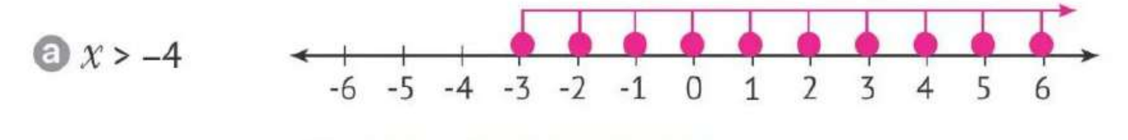
ⓒ The inequality that represents the statement "All values to the right of 0 on a number line are .... ([$x > 0$] or $x < 0$ or $x \leqslant 0$ or $x \geqslant 0$)

ⓓ Which of the following values is a solution to the inequality $x < -2$? (0 or 1.5 or [–3] or –2)

ⓔ Which of the following values is not a solution to the inequality $x > -1$? (1 or 0 or [–2] or –0.5)

2 Represent each of the following inequalities on a number line (In the set of integers):

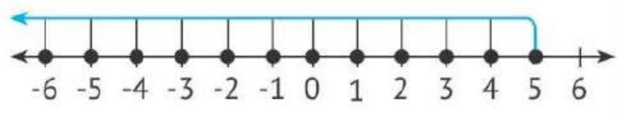
ⓐ $x > -4$



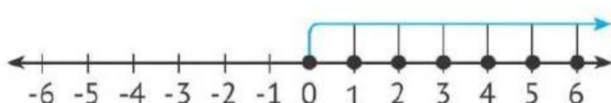
ⓑ $x \leqslant 0$

3 Write the inequality represented by each of the following number lines (In the set of integers):

ⓐ 



ⓑ 



Assessment on Unit 4



First: **Choose the correct answer:**

a. If $a + 3 = 7$, then $a =$ .... (7 or 3 or 10 or [4])

b. If $b = 6$, then $b -$ .... $= 2$. ([4] or 8 or 2 or 3)

c. If $5x = 40$, then $x =$ .... (35 or 45 or [8] or 200)

d. If $y = 6$, then $\frac{y}{\dots} = 2$. ([3] or 8 or 12 or 4)

e. The inequality that represents all values "greater than 4" is ....

([$x > 4$] or $x < 4$ or $x \leqslant 4$ or $x \geqslant 4$)

f. The inequality that represents all values "less than or equal to -2" is ....

($x > -2$ or $x < -2$ or [$x \leqslant -2$] or $x \geqslant -2$)

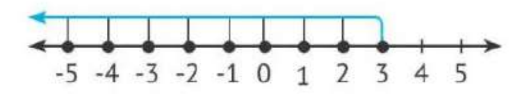
g. The inequality that represents all negative numbers are ....

($x > 0$ or [$x < 0$] or $x \leqslant 0$ or $x \geqslant 0$)

h. Which of the following is a solution to the inequality $x < -6$?

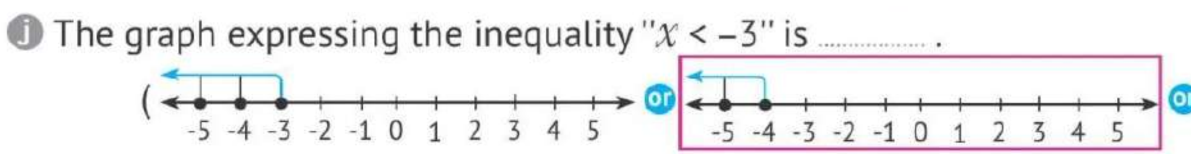
(5 or -5 or [-7] or 7)

i. The inequality represented by the corresponding graph is ....



($x > 4$ or [$x < 4$] or $x \leqslant 4$ or $x \geqslant 4$)

j. The graph expressing the inequality "$x < -3$" is ....





Second: **Complete all of the following:**

ⓐ If $x + 7 = 9$, then $x =$ ....2.... .

ⓑ If 4 m = 20, then m = ...5.... .

ⓒ If b = 12, then b − ....4.... = 8.

ⓓ If d = 3, then ..6.. × d = 18.

ⓔ If k = 6, then 2 = ...12.... ÷ k.



ⓕ The equation that represents the corresponding model is $3x = 15$.

ⓖ The inequality that represents all values "less than −6" is ...$x < -6$... .

ⓗ The inequality that represents all values "greater than or equal to 3" is ...$x \geq 3$... .

ⓘ The inequality that represents all positive integers are ...$x > 0$ or $x \geq 1$...

ⓙ The similarities between the graphs of the two algebraic expressions $x = 9$ and $x \geqslant 9$ are ..9 belongs to both

Third: **Answer the following:**

1 Find the value of the variable in each of the following equations:

ⓐ $x - 5 = 4$

$x = 4 + 5$

$x = 9$

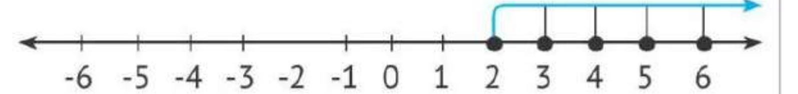
ⓑ $4x = 24$

$x = 24 \div 4$

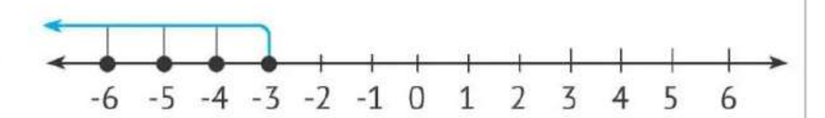
$x = 6$

2 Use the following number line to write inequalities in the set of integers:

ⓐ ....$x > 1$ or $x \geq 2$....



ⓑ ....$x < -2$ or $x \leq -3$....



Accumulative Assessment on



Units 1–4

First: **Choose the correct answer:**

ⓐ The least common multiple of any two prime numbers is ....
(the greater number or 1 or their sum or [their product])

ⓑ The integer that expresses (The depth of a well of 8 meters) is ....
([-8] or 8 or $\frac{1}{8}$ or $-\frac{1}{8}$)

ⓒ The number of terms that make up the algebraic expression "5 + 2 a b" is .... terms. ([2] or 3 or 4 or 5)

ⓓ If Basim is "x" years old now, how old will he be after 5 years? ....
($x - 5$ or [$x + 5$] or $5 \div x$ or $5x$)

ⓔ If "a + 3 = 7", then 2 a = ... (10 or 4 or [8] or 20)

Second: **Complete the following:**

ⓐ The GCF of the two relatively prime numbers is ....1.... .

ⓑ $8 \times (..9.. + ..2..) = (..8.. \times 9) + (..8.. \times 2)$

ⓒ The number "-3" is the opposite of the number ....3.... .

ⓓ The absolute term in the algebraic expression $7x + 1$ is ....1.... .

ⓔ The inequality that represents all values less than -6 is ..$x < -6$.. .

Third: **Answer the following:**

1 Write a numerical expression that expresses the largest number of groups that can be formed with 12 boys and 18 girls, such that each group has the same number of boys as well as girls.

$(6 \times 2) + (6 \times 3) = 6 \times (2 + 3)$

$12 = 2 \times 2 \times 3$
$18 = 2 \times 3 \times 3$
GCF = $2 \times 3 = 6$

2 Solve each of the following equations:

ⓐ $x - 4 = 8$

$x = 8 + 4$

$x = 12$

ⓑ $3y = 24$

$y = 24 \div 3$

$y = 8$

Theme 2

Mathematical Operations and Algebraic Thinking (Statistics and Data Analysis)



Concept 5.1 Explore Relationships Between Two Variable

Lessons 1&2 The Relationship Between Dependent and Independent Variables
Applications on Dependent and Independent Variables

1 Determine the independent variable and the dependent variable in each of the following situations:

a	The money you spend (Independent or **Dependent**)	and	The types of games you like (**Independent** or Dependent)
b	The menu (**Independent** or Dependent)	and	What you order from the food stall (Independent or **Dependent**)
c	How much you laughed (Independent or **Dependent**)	and	How funny the joke was (**Independent** or Dependent)
d	The number of cars in the garage (Independent or **Dependent**)	and	The area of the garage (**Independent** or Dependent)
e	The number of students participating in the trip (**Independent** or Dependent)	and	The number of supervisors (Independent or **Dependent**)
f	The number of days of going to the club (**Independent** or Dependent)	and	The number of training hours (Independent or **Dependent**)
g	The amount of food you eat (**Independent** or Dependent)	and	The amount of weight gain (Independent or **Dependent**)
h	The speed of the vehicle (**Independent** or Dependent)	and	The distance traveled in one hour (Independent or **Dependent**)
i	The money you have (**Independent** or Dependent)	and	The number of pens you can buy (Independent or **Dependent**)

2 **Determine the independent variable and the dependent variable in each of the following relationships:**

ⓐ

Relationship	$e = 8 - r$	$\frac{s}{3} = b$	$z + 5 = m$	$y = 5x$
Independent Variable	r	s	z	x
Dependent Variable	e	b	m	y

ⓑ

Relationship	$2a = b$	$f = t + 4$	$p - 3 = z$	$3m = w$
Independent Variable	a	t	p	m
Dependent Variable	b	f	z	w

3 **The price of one pen is 9 pounds. Complete:**

ⓐ The equation that represents the relationship between the number of pens (x) and the purchase price (y) is: .... $y = 9x$ ....

ⓑ The independent variable is .... x ....

ⓒ The dependent variable is .... y ....

ⓓ The price of 6 pens is: .... $y = 9 \times 6 = 54$ pounds ....

4 **15 pounds will be added for the delivery of fast food meals in a restaurant. Complete:**

ⓐ The equation represents the relationship between the price of meals (x) and the amount to be paid, including delivery (y) is: .... $y = x + 15$ ....

(b) The independent variable is x.

(c) The dependent variable is y.

(d) The required amount if the price of meals is 120 pounds is 120 + 15 = 135 pounds.

5 Hazem owns a discount card of 50 pounds. Complete :

(a) The equation represents the relationship between Hazem's purchases amounted (x) pounds, the amount to be paid after the discount (y) pounds is $y = x - 50$

(b) The independent variable is x.

(c) The dependent variable is y.

(d) The required amount if the purchase price before the discount is 420 pounds, is: 420 – 50 = 370 pounds

6 Speed of a car = distance ÷ time. If the time is 3 hours.

(a) The equation representing the relationship between distance (x) and speed (y) is $y = x \div 3$.

(b) The independent variable is x.

(c) The dependent variable is y.

(d) Calculate the speed in each of the following cases, such that the time is constant (3 hours):

Distance (km)	420	360	270	210	180
Speed (km per hour)	140	120	90	70	60

7 Complete the following

a) In the equation $8x = y$, the independent variable is .... x ....

b) In the equation $m - 8 = a$, the dependent variable is .... a ....

c) If the price of books depends on the number of books purchased, then:

1. The independent variable is .... number of books ....
2. The dependent variable is .... Price of books ....

d) If the number of baked goods depends on the amount of flour used, then:

1. The independent variable is .... The amount of flour ....
2. The dependent variable is .... The number of baked ....

e) If the independent variable is what Ahmed saves each month and the dependent variable is what he saves in a whole year,

then .... The amount that Ahmed saved in whole year ....

depends on .... The amount that Ahmed saved each mounth ....

Assessment on Lessons 1&2

Unit 5

1 **Choose the correct answer:**

a In "$u = 3 \div w$", the independent variable is .... ([w] or u or 3 or $\frac{w}{3}$)

b In "$a = 5d$", the dependent variable is .... (5 or [a] or d or 5d)

c If the amount of fuel consumed by the car depends on the distance traveled, then the independent variable is the ....

(fuel amount or [distance traveled] or traveled time or temperature)

d If the dependent variable is the student's score in the exam, then the independent variable is ....

(the type of pen used in the solution or the age of the student or [the number of correct answers] or the number of questions in the exam)

2 **Diaa saves 150 pounds every month, so if the amount he saves in (x) month(s) is (y) pounds, then**

a The equation that represents this situation is ....$y = 150x$.... .

b The independent variable is ....x.... the dependent variable is ....y.... .

c What Diaa saves in a year is ....150 X 12 = 1800 pounds.... .

3 **The value of one student's participation in a school trip is 90 pounds. If the number of participating students is (x) and the total participation value for all students is (y).**

a The equation that represents this situation is ....$y = 90x$....

b The independent variable is ....x.... .

c The dependent variable is ....y.... .

d If the number of participants is 35 then the total of participation value is ....90 X 35 = 3,150 pounds.... .

Lesson 3 Analyzing the Relationship Between Dependent and Independent Variables

1 Complete the following using variables "x" and "y" where "x" is an independent variable:

	Rule	Equation
a	add 4	$y = x + 4$
b	subtract 7	$y = x - 7$
c	Multiply by 5	$y = 5x$
d	Divide by 7	$y = x \div 7$
e	multiply by 2, then add 3	$y = 2x + 3$
f	divide by 2, then add 4	$y = x \div 2 + 4$
g	Add 7 and then multiply by 2	$y = 2(x + 7)$
h	Add 6, then divide by 3	$y = (x + 6) \div 3$
i	Multiply by 5, then subtract 2	$y = 5x - 2$
j	Divide by 4, then subtract 3	$y = (x \div 4) - 3$
k	subtract 2, then multiply by 4	$y = (x - 2) \times 4$
l	subtract 9, then divide by 2	$y = (x - 9) \div 2$

2 Notice each table, identify the rule, and then complete the pattern:

a

Inputs (x)	9	10	7	5	12
Outputs (y)	4	5	2	0	7

Rule: subtract 5

Equation: $y = x - 5$

b

Inputs (x)	3	2	4	6	10
Outputs (y)	9	6	12	18	30

Rule: multiply by 3

Equation: $y = 3x$

c

Inputs (x)	2	3	4	5	6
Outputs (y)	8	12	16	20	24

Rule: multiply by 4

Equation: y = $4x$

d

Inputs (x)	1	2	3	4	5
Outputs (y)	8	13	18	23	28

Rule: multiply by 5 then add 3

Equation: y = $5x + 3$

e

Inputs (x)	3	4	5	6	9
Outputs (y)	3	6	9	12	21

Rule: subtract 2 then multiply 3

Equation: y = $(x - 2) \times 3$

f

Inputs (x)	6	8	10	14	18
Outputs (y)	0	1	2	4	6

Rule: Divide by 2 then subtract 3

Equation: y = $x \div 2 - 3$

g

Inputs (x)	4	7	10	13	25
Outputs (y)	1	2	3	4	8

Rule: subtract 1 then divide by 3

Equation: y = $(x - 1) \div 3$

3 **Complete the following statements using the variables 'x "and "y":**

a. If the rule is "add 3.1", then the equation is $y = x + 3.1$.

If x = 2.9, then y will be: $y = 2.9 + 3.1 = 6$.

b. If the rule is "multiplication by 2", then the equation is $2x$.

If x = 8, then y will be: $y = 2 \times 8 = 16$.

c. If the rule is "divide by 3", then the equation is $y = x \div 3$.

If x = 15, then "y" will be $y = 15 \div 3 = 5$.

d. If the rule is "subtraction from 8" then the equation is $y = 8 - x$.

If x = 3.5, then "y" will be $y = 8 - 3.5 = 4.5$.

e) If the rule equation is "y" = 3 (x + 5), then the rule is ....

add 5 then multiply by 3

If x = 2, then "y" will be .... y = 3 X (2 + 5) = 3 X 7 = 21 ....

f) If the equation y = (9 – x) × 2 then the rule is ....

.... subtract from 9 the multiply by 2

If x = 3, then "y" will be .... y = (9 – 3) X 2 = 6 X 2 = 12 ....

4 Choose the correct answer from the brackets:

a) The equation that expresses the rule "subtract from 9" is ....

(y = x –9 or **y = 9 – x** or y – x = 9 or y = 9 x)

b) The equation that expresses the rule "multiply by 2 and then add 5" is

.... (y = 5x + 2 or y = 2 (x + 5) or y = 5 (x + 2) or **y = 2x + 5**)

c) The equation that expresses the rule "add 6 then multiply by 3" is ....

(y = 3 x + 6 or **y = 3 (x + 6)** or y = 6 x + 3 or y = (x + 3) × 6)

d) The rule that represents the equation: y = $\frac{1}{3}$ x is ....

(**divide by 3** or multiply by 3 or divide by $\frac{1}{3}$ or or subtract $\frac{1}{3}$)

e) The rule that represents the equation: y = (x –3) ÷ 2 is ....

(divide by 2, then subtract 3, or **subtract 3, then divide by 2**

or divide by 3, then subtract 2, or subtract 2, then divide by 3)

f) The rule that represents the equation: y = 5 x –2 is ....

(multiply by 2, then subtract 5, or subtract 2, then multiply by 5

or **multiply by 5, then subtract 2,** or subtract 5, then multiply by 2)

g) If y = 6 x + 4, x = 3 then y = ... (10 or **22** or 18 or 67)

h) If y = $\frac{1}{4}$ x –2, x = 8 then y = ... (**0** or 2 or 6 or 30)

i) The equation that represents the corresponding table is ....

x	1	3	5
y	4	8	12

(y = x + 3 or y = 4 x or **y = (x + 1) × 2** or y = 2 x + 2)

Assessment on Lesson 3

Unit 5

1 Choose the correct answer:

ⓐ The equation that expresses the rule "add 4" is ....

($y = x + 4$ or $y = 4 - x$ or $y + x = 4$ or $y = 4x$)

ⓑ The rule that expresses the equation "$y = 5x$" is: ....

(add 5 or multiply by 5 or divide by 5 or subtract 5)

ⓒ If $y = 2(x + 4)$, $x = 5$, then $y =$ .... (11 or 29 or 18 or 14)

ⓓ The equation that expresses the rule "divide by 2 then add 5" is:

....

($y = 2x + 5$ or $y = \frac{1}{2}x + 5$ or $y = \frac{x + 5}{2}$ or $y = \frac{1}{5}x + 2$)

2 Complete the following table:

	Rule	Equation	Independent Variable	Dependent Variable	Input x	Output y
ⓐ	Add 4, then divide by 3	$y = (x + 4) \div 3$	x	y	5	3
ⓑ	Divide by 2, then subtract 1	$y = (x \div 2) - 1$	x	y	8	3
ⓒ	subtract 5 then multiply by 2	$y = (x - 5) \times 2$	x	y	7	4
ⓓ	Multiply by 3 then add 4	$y = 3x + 4$	x	y	4	16

3 Use the equation "$y = 2x + 3$" and complete the following table:

X	2	5	6	7	9	1	3	8	4
Y	7	13	15	17	21	5	9	19	11

Theme 2

Lesson 4 Graph Representation for Dependent and Independent Variables

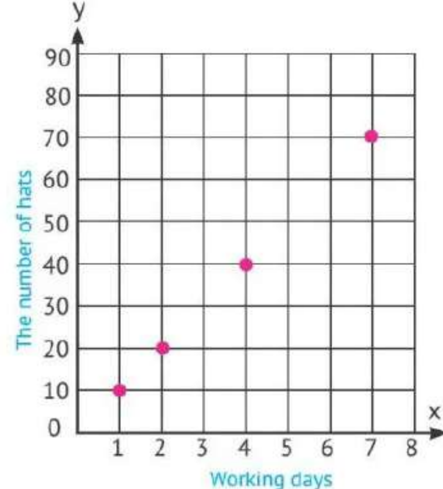
1 **Omar manufactures hats, producing 10 hats per day. Complete the following table representing the number of working days (x), and the number of hats produced (y).**

Write an equation that shows the relationship between the variables "x" and "y" and then represent it graphically.

x	1	2	4	7
y	10	20	40	70
(x, y)	(1, 10)	(2, 20)	(4, 40)	(7, 70)

The equation is:

$y = 10x$



2 **A restaurant adds 25 pounds for delivering ready-made meals to customers, regardless of the number of meals.**

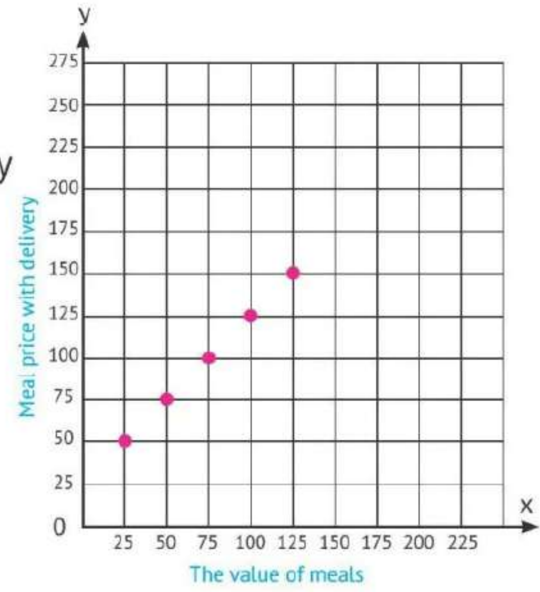
Complete the following table, where the variable "x" represents the value of the meals, and the variable "y" represents the value of the meals after adding the delivery amount.

Write an equation that shows the relationship between the variables "x" and "y" and then represent it graphically

x	25	50	75	100	125
Y	50	75	100	125	150

The equation is:

$y = x + 25$

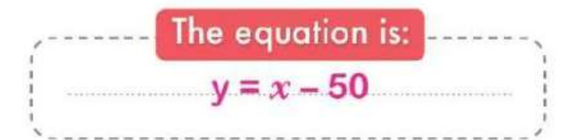


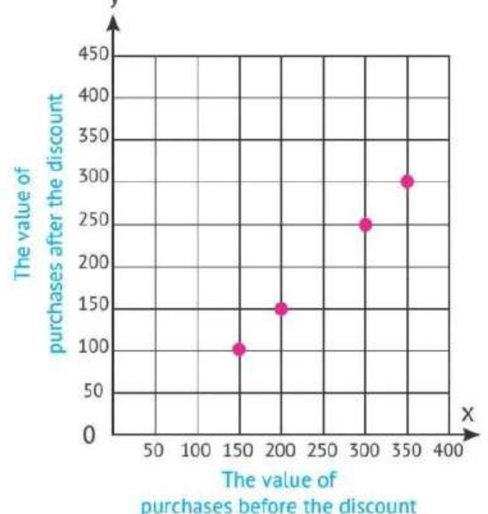
3 Nader has a 50-pound discount card at a clothing store.

Complete the following table, where the variable "x" represents the value of purchases before the discount, and the variable "y" represents the value of purchases after the discount.

Write an equation that shows the relationship between the variables "x" and "y" and then represent it graphically.

x	150	200	300	350
y	100	150	250	300
(x, y)	(150, 100)	(200, 150)	(300, 250)	(350, 300)





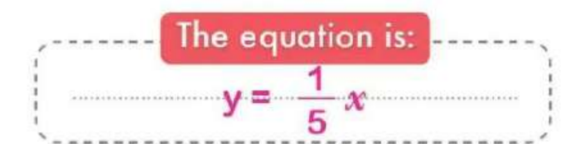
4 The school has 5 classes for the sixth grade.

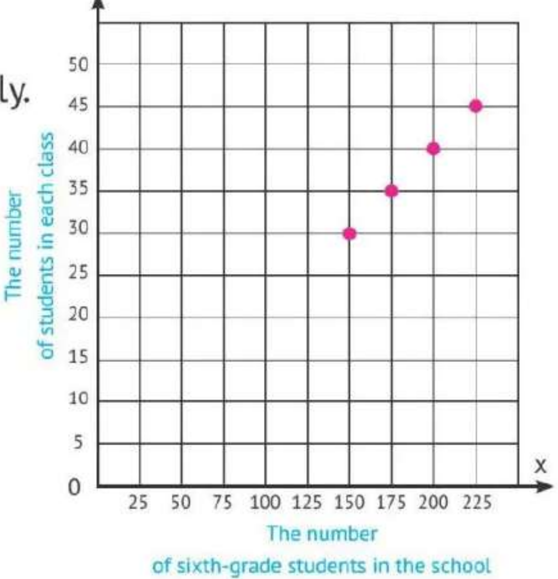
Complete the following table, where the variable "x" represents the number of sixth-grade students in the school.

The variable "y" represents the number of students in each class.

Write an equation that shows the relationship between the variables "x" and "y" and then represent it graphically.

x	150	175	200	225
Y	30	35	40	45





Assessment on Lesson 4

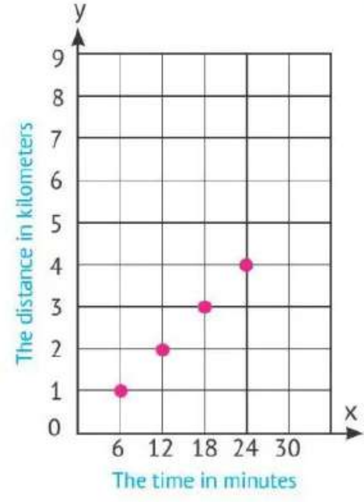
1 **A cyclist on one wheel travels two kilometers in 12 minutes Complete the following table, where the variable "x" represents the time in minutes, and the variable "y" represents the distance in kilometers.**

Write an equation that shows the relationship between the variables "x" and "y", then represent it graphically.

x	6	12	18	24
y	1	2	3	4
(x, y)	(6 , 1)	(12 , 2)	(18 , 3)	(24 , 4)

The equation is:

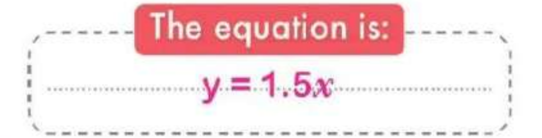
$y = x \div 6$



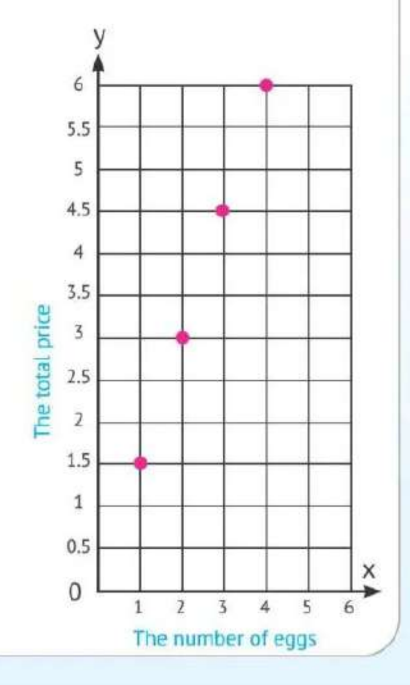
2 **Hossam buys 4 eggs for 6 pounds.**

Complete the following table, where the variable "x" represents the number of eggs, and the variable "y" represents the total price. Write an equation showing the relationship between the variables "x" and "y", and then represent it graphically.

x	1	2	3	4
y	1.5	3	4.5	6
(x, y)	(1 , 1.5)	(2 , 3)	(3 , 4.5)	(4 , 6)


The equation is:

$y = 1.5x$



Assessment on Unit 5

First: **Choose the correct answer:**

a) In the equation "$a = 3b$", the independent variable is ....

(a or **b** or 3 or 3b)

b) In the equation "$m + 5 = r$", the dependent variable is ....

(m or 5 or **r** or 5m)

c) If the independent variable is the number of studying hours, then the dependent variable is the .... (**exam result** or school uniform color or means of access to school or number of class students)

d) If the dependent variable is the number of training hours, then the independent variable is .... (**the number of days you go to the club** or the distance between the club and the house or the color of your training clothes or the height of the house)

e) The equation that expresses the rule "subtract from 6" is ....

($y = x - 6$ or **$y = 6 - x$** or $y - x = 6$ or $y = 6x$)

f) The equation that expresses the rule "add 5 then multiply by 2" is .... ($y = 2x + 5$ or **$y = 2(x + 5)$** or $y = 5x + 2$ or $y = (x + 2) \times 5$)

g) The rule that represents the equation "$y = (x - 8) \div 3$" is ....

(divide by 8, then subtract 3 or **subtract 8, then divide by 3** or divide by 3, then subtract 8 or subtract 3, then divide by 8)

h) If $y = 2x + 3$, $x = 2.5$, then $y =$ .... (5 or 11 or **8** or 5.5)

i) If $y = 2(x + 4)$, $x = 5$, then $y =$ .... (11 or 29 or **18** or 14)

j) If $y = 5x - 8$, $x = 8$, then $y =$ .... (**32** or 2 or 30 or 12)

Second: Complete the following:

ⓐ In the equation "8 a = b" the independent variable is ....a........ .

ⓑ If the number of cars in the garage depends on the size of the garage, then:

1 the independent variable is ....size of garage........ .

2 the dependent variable is ....number of cars........ .

ⓒ If the rule is "add 2.4", then

1 the equation is ..$y = x + 2.4$.. . 2 if x = 4, then y = ..$4 + 2.4 = 6.4$.. .

ⓓ If the rule is "divide by 4" then

1 the equation is ..$y = x \div 4$.. . 2 if x = 16, then y = ..$16 \div 4 = 4$.. .

ⓔ If the equation is $y = (15 + x) \div 4$, then :

1 the rule is ..add 15 then divide by 4.. . 2 if x = 5, then y = ..$(15 + 5) \div 4 = 20 \div 4 = 5$.. .

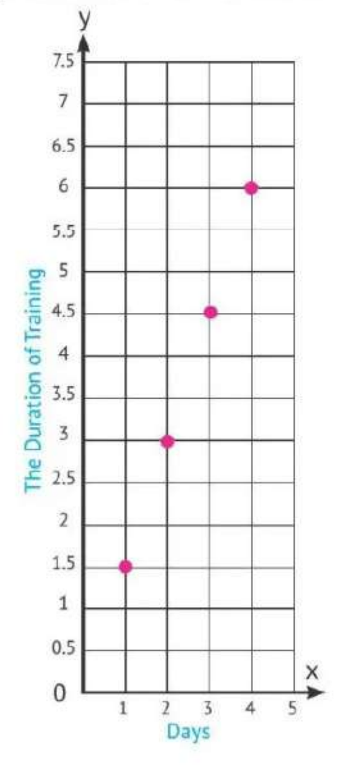
Third: Sameh trains for 6 hours divided into 4 days equally:

Complete the following table, where the variable "x" represents the number of days, and the variable "y" represents the duration of training in hours. Write an equation that shows the relationship between the variables "x" and "y", and then represent it graphically.

x	1	2	3	4
y	1.5	3	4.5	6
(x, y)	(1 , 1.5)	(2 , 3)	(3 , 4.5)	(4 , 6)

The equation is:

$y = 1.5x$



Accumulative Assessment on Units 1–5



First: **Choose the correct answer:**

a) 8 and .... are relatively prime numbers. (6 or **15** or 20 or 12)

b) An integer between 2 and −2 is ....

(**−1** or −3 or 3 or −4)

c) The number **m** plus 18 and the result divided by 3 = ...

($m + \frac{18}{3}$ or $\frac{m}{3} + 18$ or $3 \div (m + 18)$ or **$(m + 18) \div 3$**)

d) 3^4 = ... ($4 \times 4 \times 4$ or **$3 \times 3 \times 3 \times 3$** or 3×4 or $3 + 4$)

e) If $y = 2$, then $\frac{y}{......} = 9$ (18 or **3** or 27 or 9)

Second: **Complete the following:**

a) Prime numbers less than 10 are **2 , 3 , 5 , 7** .

b) **9** × (3 + 6) = (9 × **3**) + (9 × **6**)

c) Integers between -3 and 2 are **-2 , -1 , 0 , 1**

d) Opposite numbers on a number line have **same** absolute values (**same** - different)

e) The value of the expression "$3 \times (y^2 - 5)$" when y = 3 is **12** .

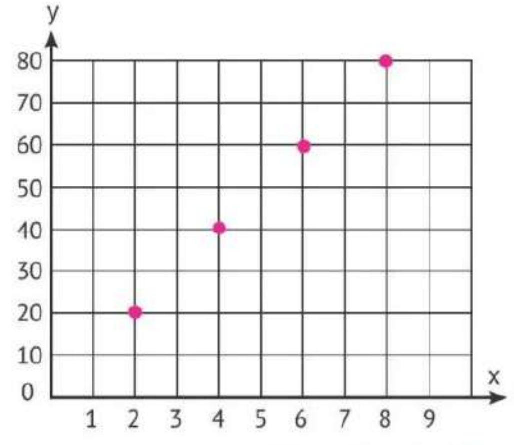
Third: **Answer the following:**

Omar manufactures hats, producing 10 hats per day, the following table represents the number of working days (x) and the number of hats produced (y). Represent it graphically.

x	2	4	6	8
Y	20	40	60	80

The equation is:

$y = 10x$



Unit 6 Data Distributions

Concept 6.1 Applications on Collecting and Representing Data

Lesson 1 Data and Statistical Questions

1 Select the type of each of the following questions:

(a statistical question or a non-statistical question)

	Question	Statistical	Non-statistical
a	What is your favourite subject?		✓
b	What is the most favourite color for the class's students?	✓	
c	What is your name?		✓
d	How many members of your family?		✓
e	How old are you ?		✓
f	How many students are there in your school classes?		✓
g	What is the most favorite sport for the class's students?	✓	
h	Do you practice swimming?		✓
i	How much money do students spend in a class per day?	✓	
j	What color are the eyes of the students in your class?	✓	

2 **Determine whether the results from each question would give you numerical data or categorical data.**

	Question	Numerical Data	Categorical Data
a	How many students' families are in your class?	✓	
b	What is the most favorite sport for the class's students?		✓
c	What football teams do your students support?		✓
d	What is the monthly income of the employees of the most profitable companies?	✓	
e	What are the heights of the students in your class?	✓	
f	How many hours did the workers work in your father's factory?	✓	
g	What are the blood groups of the students in your class?		✓
h	What are the weights of the students in your class?	✓	
i	How many brothers and sisters does each of the students in your class have?	✓	
j	What is the most favourite subject for the students in your class?		✓

3 Complete the following:

a) Types of questions are ....statistical........ questions and ....non-statistical........ questions.

b) Types of statistical data are ....categorical.... data and ....Numerical.... data.

c) ....Numerical.... data is written in the form of numbers.

d) ....categorical.... data is written in the form of words.

e) What is your eyes' color? it is a ..Non Statistical question, while what color are the eyes of the students in your class? is a ....Statistical.... question.

f) Do you like the red color? is a Non Statistical question, while what are the pupils' favourite colors? is a ....Statistical.... question.

g) The monthly income of an institution's employees is a ....Numerical.... data.

h) The number of letters in each student's first name is a ....Numerical.... data.

i) The types of pens preferred by your class's students is a ....categorical.... data.

j) The types of pets owned by the class's pupils are a ....categorical.... data, while the number of pets owned by the class's pupils, is a ....Numerical.... data.

4 Choose the correct answer:

a) A statistical question ....

(results in a lot of different answers or its answer is yes or no or has one answer or its answer is one number)

b) .... are categorical data.

(Dates of birth or Ages or Weights or Favorite colors)

c) .... are/is categorical data.

(The number of students in each class or The number of family members or Favorite TV shows or Test scores)

d) .... are numerical data.

(Preferred colors or Blood groups or Birthplaces or Ages)

e) .... are numerical data.

(Salaries or Favorite sports or Eye colors or Nationalities)

f) All of the following are categorical data, except ....

(favourite foods or occupations or weights or eye colors)

g) All of the following are categorical data, except ....

(marital statuses or heights or place of birth or skin color)

h) All of the following are numerical data, except ....

(temperatures or lengths or names or weights)

i) All of the following are numerical data, except ....

(types of pets or test scores or ages or number of pets)

Assessment on Lesson 1

Unit 6

1 Complete the following:

a. Numerical statistical data are written in the form of ......Numbers...... .

b. Categorical statistical data are written in the form of ......words...... .

c. What is your favorite school subject? is a .... question.
(statistical / non-statistical)

d. How many books do the students in your class read in a year?
is a .... question. (statistical / non-statistical)

e. The favorite colors of a number of pupils are .... data.
(numerical, categorical)

2 Complete the following table:

	Question	Statistical		Non-StatistiCal
		Numerical	Categorical	
a	What's your height?			✓
b	What is your classmates' favorite sport?		✓	
c	Do you go jogging?			✓
d	What football teams do your students support?		✓	
e	How many hours do you spend in school?			✓
f	What are the weights of the students in your class?	✓		
g	How many family members does each of the students in your class have?	✓		
h	What subject do you prefer?			✓

Lessons 2&3 Exploring the Histogram / Representing Data Using Histograms

1 **What is the best graph in the following situations?**

(Dot Plot - Bar Graph - Histogram)

a) How many students prefer the red color? (......Bar graph......)

b) How many students got marks in the exam from 15 to 20?

(......Histogram......)

c) What is the number of pupils in each class of the school?

(......Bar graph......)

d) How many students in your class have a family of 5?

(......Dot plots......)

e) How many Egyptian cities have a population of 2,000,000 to 3,000,000?

(......Histogram......)

f) How many trees in the garden have a height of 3 to 4 meters?

(......Histogram......)

g) How many passengers are on the first-class train?(......Bar graph......)

h) How many cities had a temperature of 40 degrees last summer?

(......Dot plots......)

i) How many students get 15 marks in the monthly exam?

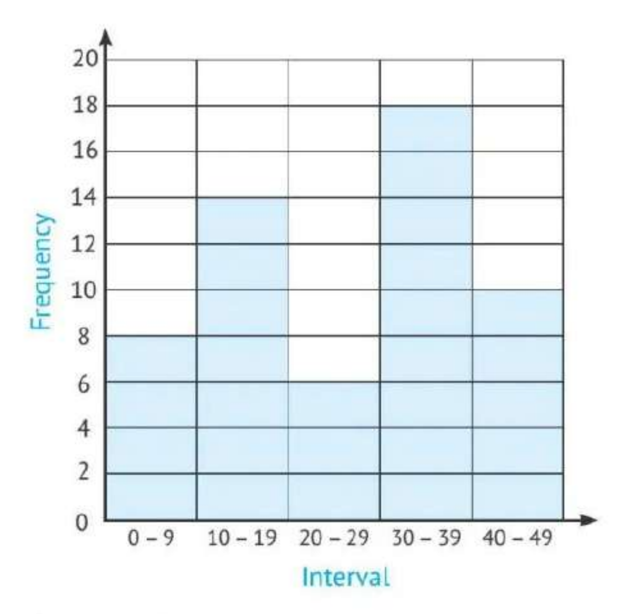
(......Dot plots......)

j) How many students had 7-10 days of defective days during the past year? (......Histogram......)

k) How many students in your class are between 150 and 160 cm in height? (......Histogram......)

2 Complete the following interval table, using the following histogram:

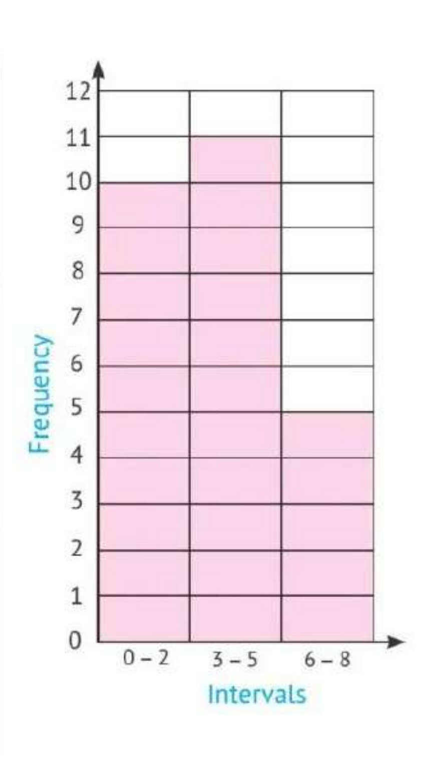
Intervals	Frequency
0 – 9	8
10 – 19	14
20 – 29	6
30 – 39	18
40 – 49	10



3 The following frequency table shows the number of days of absence for 26 students in the class during the first semester. Compose a table of periods and then complete the iterative drawing:

Number of Days	Frequency
0	3
1	2
2	5
3	4
4	6
5	1
6	0
7	3
8	2

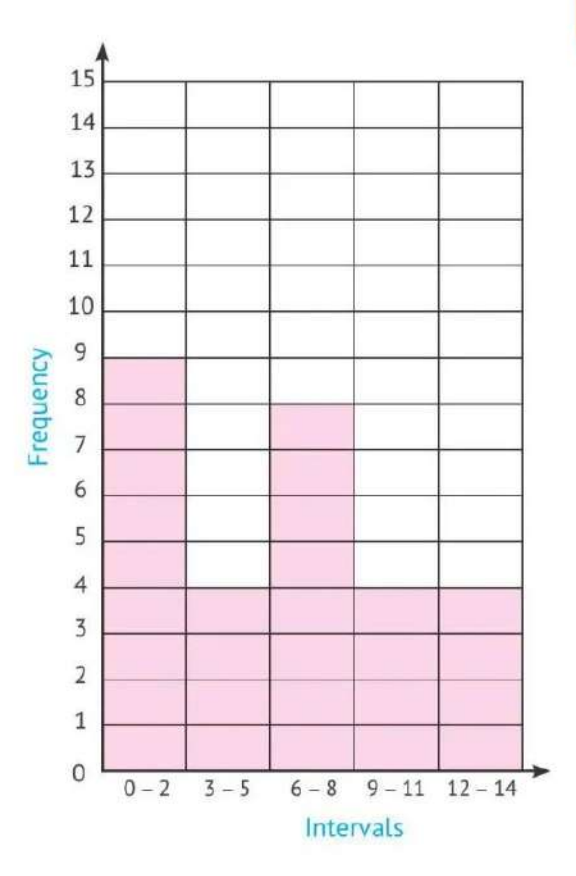
Intervals	Frequency
0 – 2	10
3 – 5	11
6 – 8	5



4 **The following frequency table shows the number of stories that students read during the school year. Complete the interval table, then complete the frequency histogram drawing:**

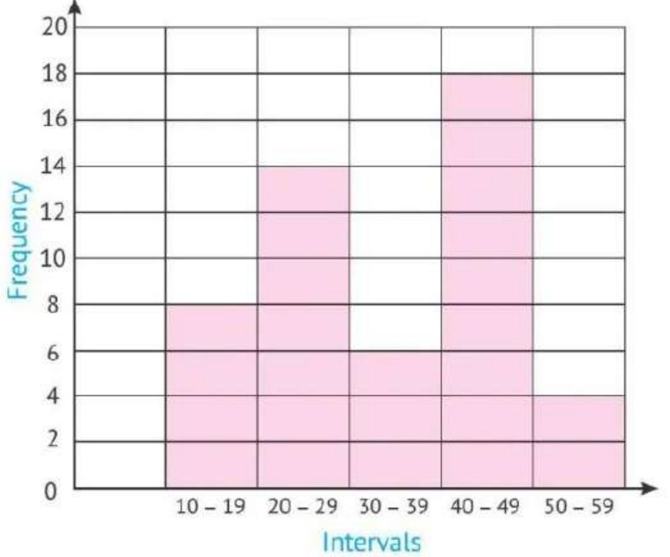
Number of Stories	Frequency
0	2
1	3
2	4
3	1
4	2
5	1
6	1
7	4
8	3
9	1
10	2
11	1
12	2
13	1
14	1

Intervals	Frequency
0 – 2	9
3 – 5	4
6 – 8	8
9 – 11	4
12 – 14	4



5 **Draw the histogram of the following distribution, which represents the scores of 50 students:**

Interval Grades	Frequency Number of students
10 – 19	8
20 – 29	14
30 – 39	6
40 – 49	18
50 – 59	4



6 Choose the correct answer:

a) The horizontal axis includes numerical periods in ....

(dot plot or bar graph or double bar graph or histogram)

b) .... don't have a vertical axis.

(Dot plots or Bar graphs or Double bar graphs or Histograms)

c) .... may use separate columns to represent the data.

(Dot plots or Bar graphs or Double bar graphs or Histograms)

d) .... have horizontal axis.

(Bar graphs or Double bar graphs or Histograms or All of the previous)

e) In the dot plots, ... (columns are used to represent data

or there is no need for a horizontal axis

or each information is represented by a point

or data is displayed grouped in intervals)

f) In the bar graph, ...

(each bar represents a number or one categorical data

or it does not need a vertical axis or the bars must touched

or each piece of information is represented by a dot)

g) In the histogram, ... (it does not need a vertical axis

or the bars must touch or data is shown above the number line

or all bars are evenly spaced)

h) In each of the bar graphs and histograms ....

(bars are used to represent data or each bar represents an interval

or each bar represents one number or the data is shown above the number line)

i) In .... there is a graduated scale for the vertical axis.

(the dot plot only or the bar graph only

or histogram only or both of bar graph and histogram)

j) .... may be used to display numerical data.

(Dot plots or Bar graphs or Histograms or All of the previous)

Assessment on Lessons 2&3

Unit 6

1 **Choose the correct answer:**

ⓐ The best graph to represent the number of pupils whose height ranges from 150 to 160 cm is a .... (dot plots or bar graph or histogram)

ⓑ The best graph to represent the number of students absent on a Sunday is a .... (dot plot or bar graph or histogram)

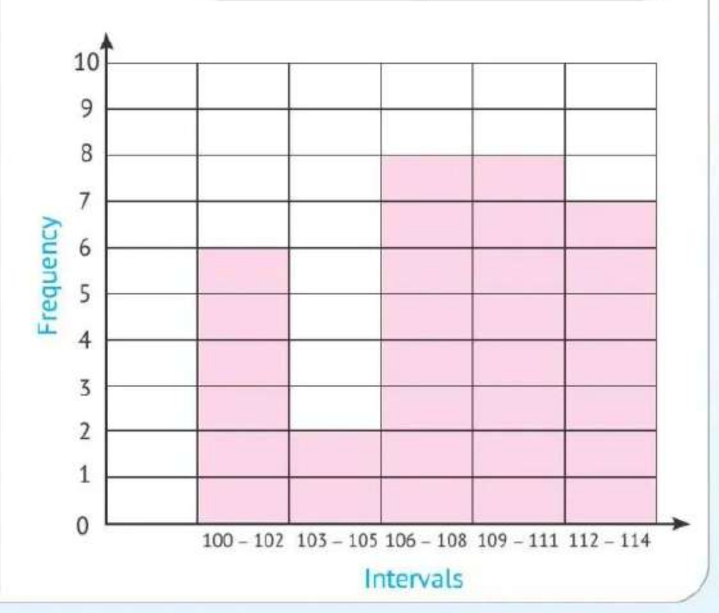
ⓒ A .... has/have two axes, horizontal and vertical.
(bar graph or double bar graph or histogram or all of the previous)

ⓓ The bar graph .... (can display numerical and categorical data or can display only numerical data or can display only categorical data)

2 **The following frequency table represents lengths of a number of students in the class, rounded to the nearest centimeter:**

Length in Centimeters	Frequency Number of Pupils
100	2
101	3
102	1
104	2
106	3
107	4
108	1
109	5
110	2
111	1
113	2
114	5

Intervals	Frequency
100 – 102	6
103 – 105	2
106 – 108	8
109 – 111	8
112 – 114	7



Lesson 4 Exploring Box Plot

1 Complete the following:

ⓐ The median of a set of values is the element that appears in the central of data of that set.

ⓑ The median of the set of values (5, 7, 8, 3, 6) is 6

ⓒ The median of the set of values (9, 3, 7, 5) is 6

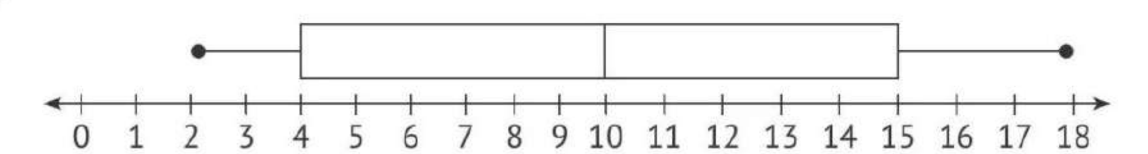
ⓓ The minimum value of (7, 8, 5, 7, 3) is 3

ⓔ The maximum value of (6, 3, 2, 4, 1) is 6

ⓕ In the values (7, 6, 2, 9, 6, 0, 6), the lower quartile is 2 and the upper quartile is 7

2 In each of the following, use the following box plots, select a summary of the five values:

ⓐ



1 The minimum value: 2

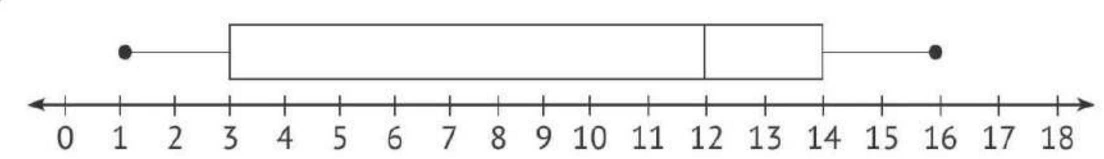
2 Lower quartile: 4

3 The median: 10

4 Upper quartile: 15

5 The maximum value: 18

ⓑ



1 The minimum value: 1

2 Lower quartile : 3

3 The median: 12

4 Upper quartile: 14

5 The maximum value: 16

ⓒ

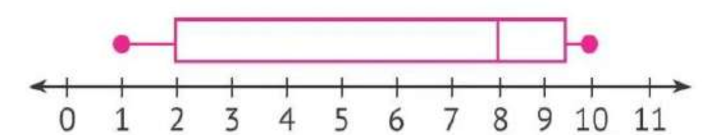
1 The minimum value: 4
2 Lower quartile: 5
3 The median: 7
4 Upper quartile: 13
5 The maximum value: 15

3 Draw a box plot for each of the following groups of values:

ⓐ 9, 8, 3, 1, 10

The Order: 1 , 3 , 8 , 9 , 10 .

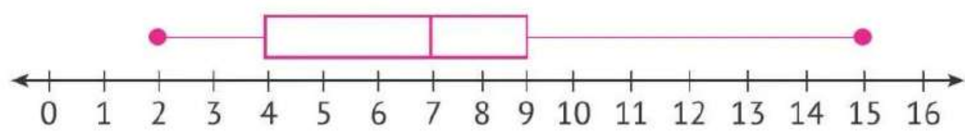
1 The minimum value: 1
2 Lower quartile: 2
3 The median: 8
4 Upper quartile: 9.5
5 The maximum value: 10



ⓑ 15, 8, 9, 2, 7, 5, 4

The Order: 2 , 4 , 5 , 7 , 8 , 9 , 15 .

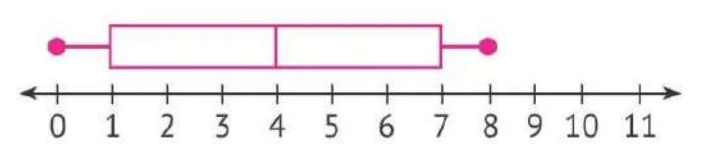
1 The minimum value: 2
2 Lower quartile: 4
3 The median: 7
4 Upper quartile: 9
5 The maximum value: 15



ⓒ 5, 6, 3, 7, 1, 0, 8, 8, 2, 1

The Order: 0 , 1 , 1 , 2 , 3 , 5 , 6 , 7 , 8 , 8 .

1 The minimum value: 0
2 Lower quartile: 1
3 The median: 4
4 Upper quartile: 7
5 The maximum value: 8



Assessment on Lesson 4

Unit 6

1 Complete the following:

a) The median of the set of values (9, 8, 4, 5, 8) is ....8........

b) The median of the set of values (3, 4, 2, 12, 8) is ....4........

c) The minimum value (7, 2, 6, 1, 9, 8) is ....1........

d) The maximum value (4, 7, 1, 8, 6) is ....8........

e) The set of values (5, 3, 1, 9, 8, 6, 7), the lower quartile is ....3........ and the upper quartile is ....8........

2 For the set of values: 10, 9, 8, 7, 6, 4, 2:

Choose the correct answer:

a) The minimum value: .... ([2] or 7 or 4 or 10)

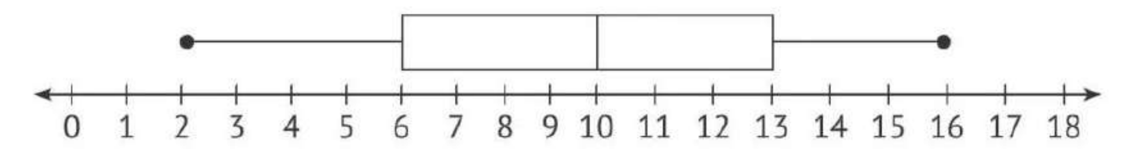
b) Lower quartile: .... (2 or 9 or 7 or [4])

c) The median: .... (4 or [7] or 9 or 10)

d) Upper quartile: .... (7 or 4 or [9] or 8)

e) The maximum value: .... (4 or 6 or 7 or [10])

3 Using the following box plot, select the 5-point summary:



a) The minimum value: ....2........

b) Lower quartile: ....6........

c) The median: ....10........

d) Upper quartile: ....13........

e) The maximum value: ....16........

4 Draw a box plot for the values (5, 2, 9, 4, 3, 6, 2):

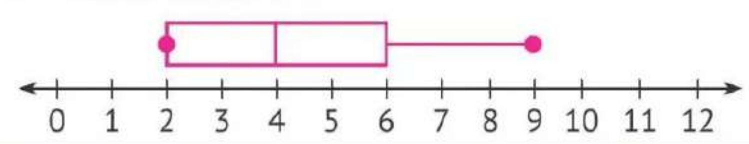
a) The minimum value: ....2........

b) Lower quartile: ....2........

c) The median: ....4........

d) Upper quartile: ....6........

e) The maximum value: ....9........

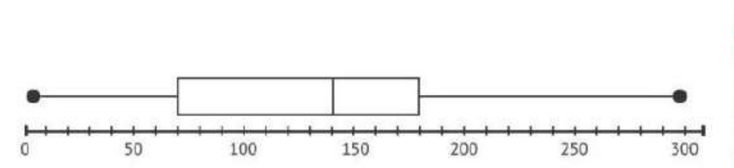


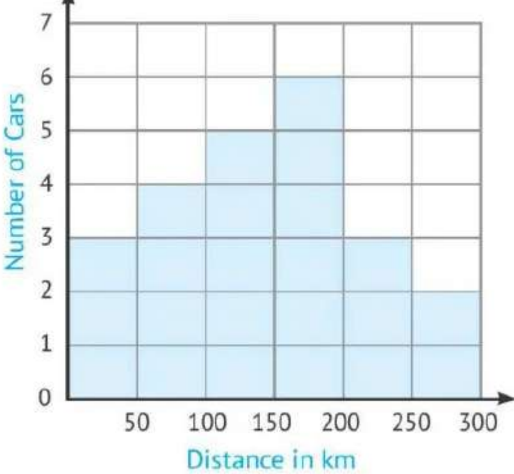
Lesson 5 Applications on Data Representations

1 **Identify the graph that can be used to answer the following statistical questions:**

	Question: What is	Graph		
		Dot Plot	Histogram	Box Plot
a	the maximum value?	✓		✓
b	the minimum value?	✓		✓
c	the median?	✓		✓
d	the upper quartile?	✓		✓
e	the lower quartile?	✓		✓
f	the total number of values?	✓	✓	
g	the number of times a specified value repeats?	✓		
h	the most frequent value?	✓		
i	the least frequent value?	✓		
j	the number of repetitions of values in a specified interval?	✓	✓	
k	the number of repeat values for a set of intervals?	✓	✓	
l	the number of values less than a specified value?	✓		
m	the number of values greater than a specified value?	✓		
n	the gaps?	✓	✓	

2 **Ahmed owns a showroom for used cars. Ahmed checked the odometers of these cars and recorded the kilometres traveled by each car. He represented these results using the histogram and the box plot, as shown:**





ⓐ Answer the following, explaining the best graph that helped you in the answer:

	Question	Answer	Graph	
			Histogram	Box Plot
1	How many cars have driven more than 200 km?	5	✓	
2	What is the median value?	140		✓
3	What is the minimum distance traveled by a car?	0		✓
4	What is the greatest distance traveled by a car?	300		✓
5	How many cars drove from 50 km to 100 km?	4	✓	

ⓑ Write two questions that can be answered using:

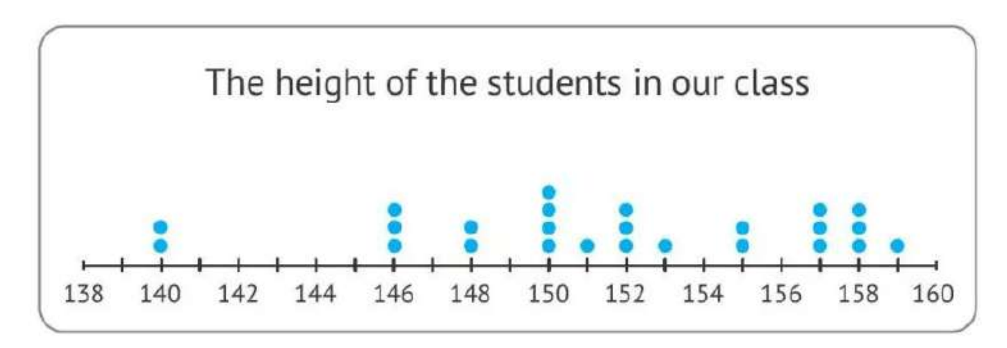
1 Histogram

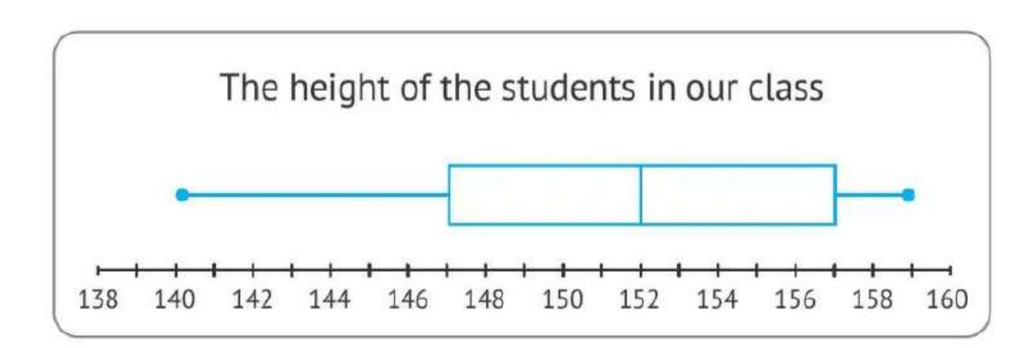
There are many answers

2 Box plot

There are many answers

3 **The dot plot and the following box plot show the heights of a number of pupils in your class:**





ⓐ Answer the following, explaining the graph that helped you in your answer.

	Question	Answer	Graph	
			Dot plot	Box Plot
1	How many students are 150 cm tall?	4	✓	
2	What is the median value?	152	✓	✓
3	What is the height of the shortest student?	140	✓	✓
4	How tall is the tallest student?	159	✓	✓
5	How many students are less than 149 cm tall?	7	✓	

ⓑ Write two questions that can be answered using both graphs:

There are many answers

4 **The following table shows data on the amount of time that sixth graders spend listening to music each week.**

Number of Minutes Students Spent Listening to Music per Week									
120	15	45	30	60	90	0	125	30	240
75	45	80	10	20	35	45	90	100	115
75	40	70	100	120	120	150	15	0	20
5	120	45	80	10	45	50	100	15	0
20	35	120	150	30	60	90	20	35	40

What is the most appropriate graph if you want to determine the number of minutes students typically spend listening to music?

(Histogram)

5 **Match each of the following with the appropriate graph:**

- (a) Representation of individual values — Dot plot 2
- (b) Representation of hundreds of notes — Box plot 3
- (c) Representation of data peaks and gaps in the data — Histogram 1

Histogram 1 · Dot plot 2 · Box plot 3

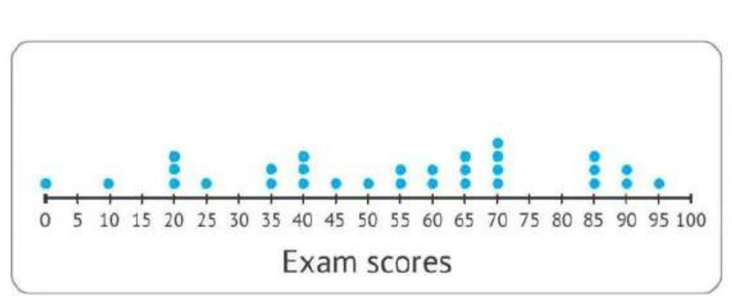
Assessment on Lesson 5

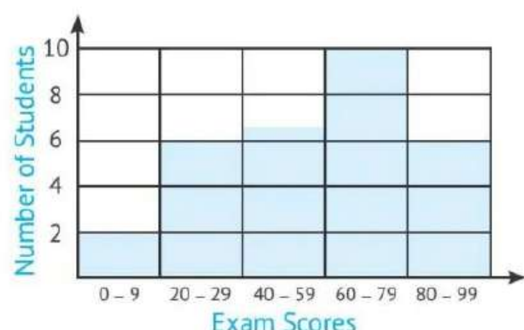
Unit 6

1 **Match each question with the appropriate drawing or drawings:**

ⓐ How many times does a specified value repeat?		Histogram 1
ⓑ What is the median value?		Dot plot 2
ⓒ How many times is the value repeated in a given period?		Box plot 3

2 **The dot plot and histogram below show the exam scores for a number of students in your class:**





Answer the following, explaining the graph that helped you in the answer:

ⓐ What is the highest grade obtained by the students?

(Answer: ....95..........) (Graph: ....Dot plot..........)

ⓑ What is the lowest score obtained by the students?

(Answer: ....0..........) (Graph: ....Dot plot..........)

ⓒ How many students did you score on the drawing?

(Answer: ....30..........) (Graph: ....Both..........)

ⓓ How many students got less than 40 marks?

(Answer: ....8..........) (Graph: ....Both..........)

ⓔ How many students got 80 degrees or more?

(Answer: ....6..........) (Graph: ....Both..........)

Assessment on Unit 6

First: **Choose the correct answer:**

a. Statistical question ....

(it results in a lot of different answers or has one answer or its answer is yes or no or its answer is one number)

b. From the categorical data ....

(birthdates or ages or weights or favorite colors)

c. From numerical data ....

(preferred colors or blood types or places of birth or ages)

d. All of the following data are categorical, except for ....

(favorite foods or jobs or weight or eye colors)

e. All of the following data are numerical, except ....

(temperatures or lengths or names or weights)

f. The horizontal axis includes numerical periods in a ....

(dot plot or bar graph or double bar graph or histogram)

g. A .... does not have a vertical axis.

(dot plot or bar graph or double bar graph or histogram)

h. In a .... there is a graduated scale for the vertical axis.

(dot plot only or bar graph only or both bar graph and histogram or histogram only)

i. The maximum value of the values 8, 6, 8, 7, 2, 6, 3 is ....

(2 or 7 or 8 or 6)

j. The upper quartile of the values 9, 3, 0, 4, 8, 1, 7 is ....

(9 or 4 or 1 or 8)

Second: Complete the following:

a. Types of questions are **Statistical** questions and **non-Statistical** questions.

b. Types of statistical data are ....**numerical**.... data and ...**Categorical**... data.

c. The monthly income of an institution's employees is from the **numerical** data.

d. The number of letters of the first name of each student in the class, is from the ....**numerical**.... data

e. The best graph to represent the number of pupils between the ages of 12 – 15 years is .....**histogram**.....

f. The best graph to represent the number of studying hours for a student on Saturday is **bar graph**.

g. The median of the values "9, 2, 8, 6" is ....**7**..........

h. The minimum value of the values 2 , 9 , 1 , 1 , 8 , 5 is ....**1**..........

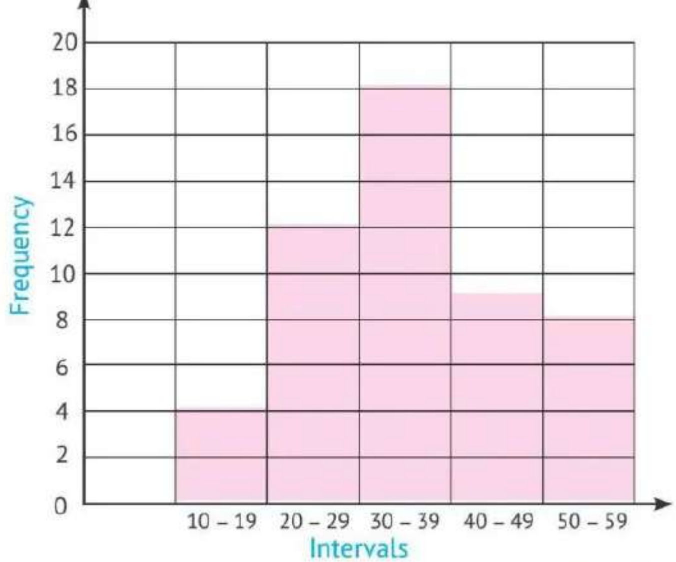
i. The most appropriate graph to represent individual data and the number of data values present is .....**dot plots**......

j. The most appropriate graph to represent peaks and gaps and aggregate data is ....**histogram**......

Third: Answer the following:

1. Draw the histogram of the following data, which represent the scores of 50 students.

Interval Grades	Frequency Number of Students
10 – 19	4
20 – 29	12
30 – 39	18
40 – 49	9
50 – 59	8



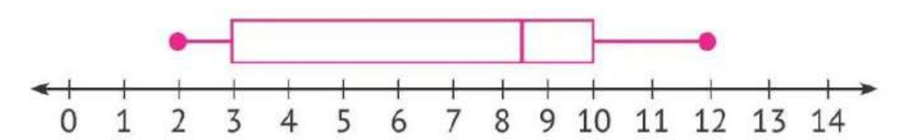
2 Draw the box plot for each of the following groups of values

(3 , 8 , 7 , 2 , 10 , 12 , 9 , 2 , 10 , 9).

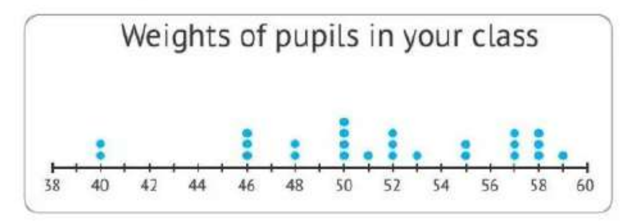
The order: 2 , 2 , 3 , 7 , 8 , 9 , 9 , 10 , 10 , 12

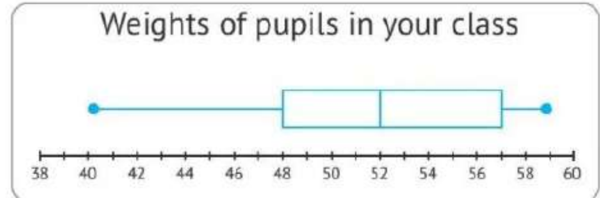
Minimum Value: 2 Maximum Value: 12 Median: 8.5

Upper Quartile: 10 Lower Quartile: 3



3 The dot plot and the box plot below show the weights of a number of pupils in your class?





a Answer the following, explaining the graph(s) that helps you in the answer.

	Question	Answer	Graph	
			Dot Plot	Box Plot
①	How many students weigh 57 kg?	3	✓	
②	What is the median value?	52	✓	✓
③	What is the weight of the lightest pupil?	40	✓	✓
④	What is the weight of the heaviest students?	59	✓	✓
⑤	How many students weight more than 54 cm?	9	✓	

b Write two questions that can be answered using:

Dot plot



① .... ② ....

Box plot

① .... ② ....

Accumulative Assessment on



Units 1–6

First: **Choose the correct answer:**

a. The GCF of relatively prime numbers is ....
(0 or **1** or their sum or their product)

b. .... is neither a positive nor a negative number. (**0** or 1 or -1 or 10)

c. The set of integers is a subset of the set of .... numbers.
(counting or natural or even or **rational**)

d. The number of terms that make up the algebraic expression "$5x + 3y + 2$" is .... (2 or **3** or 5 or 6)

e. The inequality that represents all values less than or equal to -7 is ....
($x > -7$ or $x < -7$ or **$x \leqslant -7$** or $x \geqslant -7$)

Second: **Complete the following:**

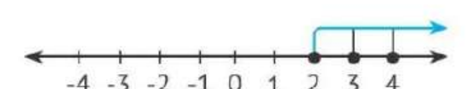
a. ....6.... to the power ....4.... $= 6^4$

b. If a meal costs 65 pounds, what is the price of "b" meals of the same type = ...65b.... .

c. If $8m = 16$, then $2m + 3 =$ ....7.... .

d. The inequality that represents positive integers is ....$x > 0$ or $x \geq 1$

e. The inequality represented on opposite number line is ....$x > 1$ or $x \geq 2$





Third: **Answer the following:**

1. Use the opposite box plot to find:

a. Minimum Value: ....2....

b. Maximum Value: ....10....

c. Median: ....6....

d. Upper Quartile: ....8....

e. Lower Quartile: ....3....

2. Find the value of each of the following:

a. $d^3 + 7$ for [$d = 3$]
$= 3^3 + 7 = 27 + 7 = 34$

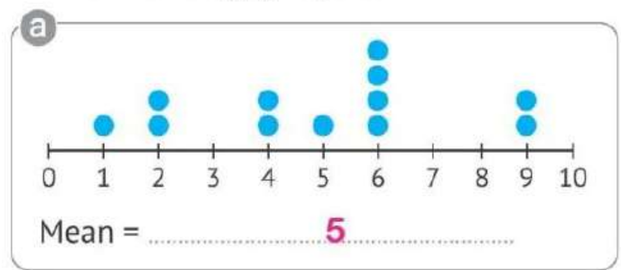
b. $37 - 4e$ for [$e = 2$]
$= 37 - 4 \times 2 = 37 - 8 = 29$

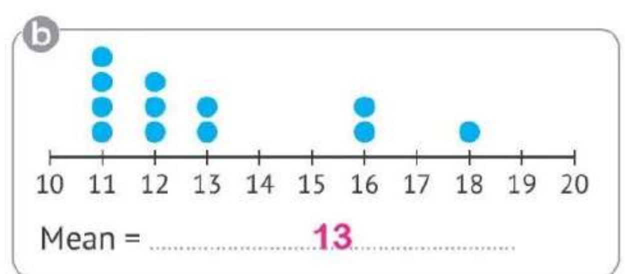
Unit 7 Measures of Central Tendency and Spread

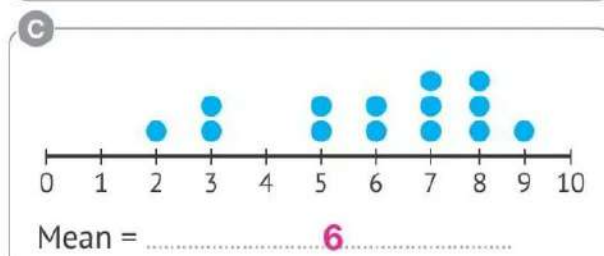
Concept 7.1 Exploring Measures of Central Tendency and Spread

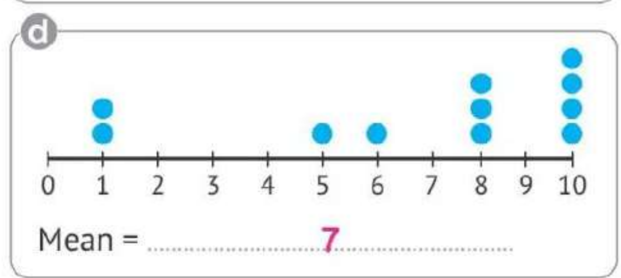
Lessons 1&2 Exploring the Balance of Data Sets / Interpreting Arithmetic Mean

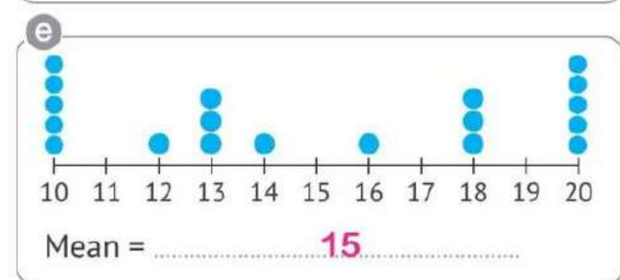
1 Determine the mean (the center of the data set) for each of the following graphs:

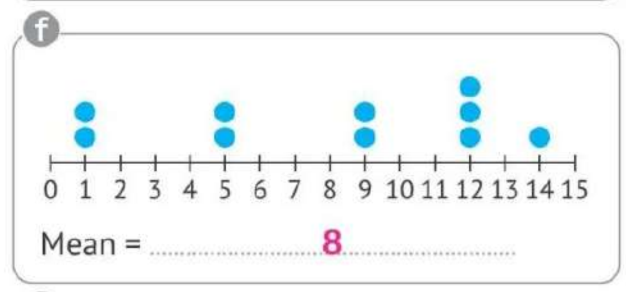
a


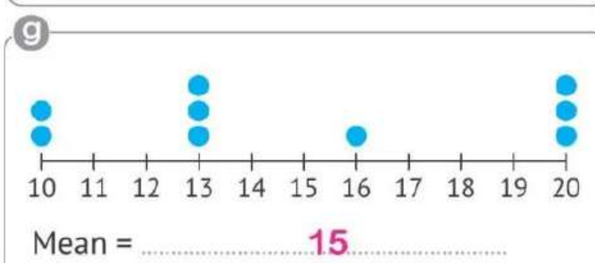
b


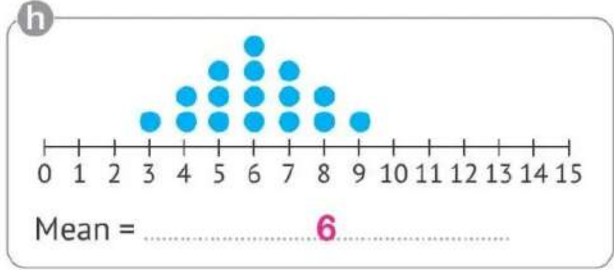
c


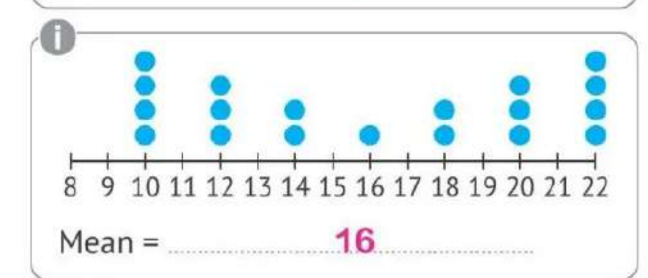
d


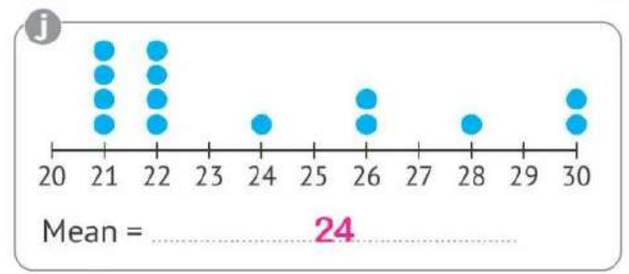
e


f


g


h


i


j


2 Find the **mean** for each of the following groups of values:

	Values	Mean
a	4, 6	$\frac{4+6}{2} = \frac{10}{2} = 5$
b	3, 8	$\frac{3+8}{2} = \frac{11}{2} = 5.5$
c	2, 4, 6	$\frac{2+4+6}{3} = \frac{12}{3} = 4$
d	1, 3, 5	$\frac{1+3+5}{3} = \frac{9}{3} = 3$
e	1, 2, 3, 4, 5	$\frac{1+2+3+4+5}{5} = \frac{15}{5} = 3$
f	35, 50, 60, 55	$\frac{35+50+60+55}{4} = \frac{200}{4} = 50$

3 If the heights of five pupils in the first preparatory grade in centimeters are: 124, 130, 122, 126, and 128.

Calculate the **mean** for these lengths.

$$\text{Mean} = \frac{124+130+122+126+128}{5} = 126$$

4 If Sheriff's grades in 3 consecutive months in Mathematics are 88, 91, and 97, then calculate his **mean** of grades.

$$\text{Mean} = \frac{88+91+97}{3} = 92$$

5 If the temperatures for a full week of December in one of the cities are: 25°, 27°, 31°, 23°, 22°, 18°, and 22°, then calculate the **mean** of these degrees.

$$\text{Mean} = \frac{25+27+31+23+22+18+22}{7} = 24$$

6 If the numbers of goals scored by Al-Ahly in 6 matches are 4, 2, 3, 1, 0, and 2, then calculate the mean for the numbers of goals

$$\text{Mean} = \frac{4+2+3+1+0+2}{6} = \frac{12}{6} = 2$$

7 The following table represents the number of study hours for a student during 6 consecutive days:

Day	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Number of Hours	$3\frac{1}{2}$	3	$2\frac{1}{2}$	3	4	2

Calculate the mean of study hours per day.

$$\text{Mean} = \frac{3\frac{1}{2}+3+2\frac{1}{2}+3+4+2}{6} = 3$$

8 Complete the following:

ⓐ The mean of the values (18, 35, 34, 6) is ..... 23.25 ..... .

ⓑ The mean of the values (6, 3, 1, 7, 6, 2, 1, 6) is ..... 4 ..... .

ⓒ If the mean of the values (3, 4, 6, x, 7) is 6, then the value of x is ..... 10 ..... .

ⓓ If the mean of the values (2, 7, 2, x) is 3, then the value of x is ..... 1 ..... .

ⓔ If the sum of 7 values equals 56, then the mean of these values is ..... 8 ..... .

ⓕ If the sum of a set of values is 45, and the mean of these values is 5, then the number of these values is ..... 9 ..... .

ⓖ If the mean of a set of values is 8 and the number of these values is 6, then the sum of these values is ..... 48 ..... .

9 Choose the correct answer:

ⓐ The mean of the values (6, 7, 8, 4, 10) is .... (35 or [7] or 10 or 4)

ⓑ The mean of the values (4, 9, 7, 1, 1, 2) is .... ([4] or 2 or 3 or 24)

ⓒ If the mean of a set of values is 3 and the number of these values is 8, then the sum of the values is equal to .... (11 or [24] or 5 or 8)

ⓓ If the mean of a set of values is 9 and the sum of these values is 45, then the number of these values is .... ([5] or 45 or 50 or 9)

ⓔ If the mean of the scores of five students is 20, then the sum of their scores is .... a degree (4 or 15 or 25 or [100])

ⓕ If the mean of Manal and Siham's ages is 7 years, and Manal's age is 8 years, then Siham's age is .... years. ([6] or 7 or 8 or 15)



Assessment on Lessons 1&2

Unit 7

1 Complete the following:

ⓐ The mean of the values (8, 3, 13) is ...8...

ⓑ The median of the values (8, 3, 4, 2) is ...3.5...

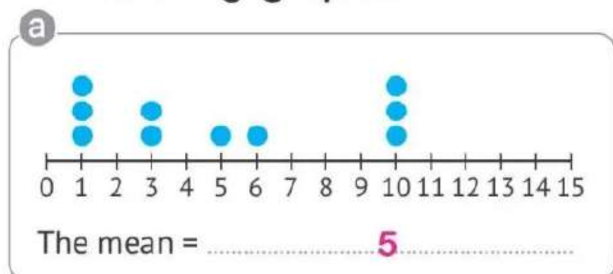
ⓒ If the sum of a group of values is 18, and the mean of these values is 3, then the number of these values is ...6...

ⓓ If the mean of 5 values is 15, then the sum of these values is ...75...

ⓔ If the mean of the values: 8, 3, 5, x, and 2 is 7, then the value of x is ...17...

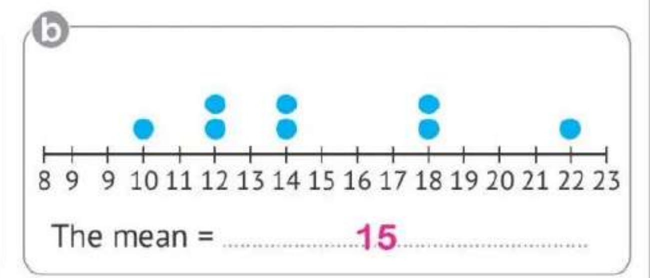
2 Determine the mean (the center of the data set) for each of the following graphs:

ⓐ



The mean = ...5...

ⓑ



The mean = ...15...

3 If the number of working hours for a worker in a factory is 5 consecutive days, as follows:

Day	Sunday	Monday	Tuesday	Wednesday	Thursday
Number of Working Hours	$6\frac{1}{2}$	7	8	$4\frac{1}{2}$	6

Calculate the mean of working hours per day.

Mean = $(6\frac{1}{2} + 7 + 8 + 4\frac{1}{2} + 6) \div 5 = 6\frac{2}{5} = 6.4$ hours

4 If the sales of a commercial store are in pounds for a period of 4 days, they are: 60,050, 36,450, 42,000, 25,500 Calculate the mean of sales for the store.

Mean = $\frac{60{,}050 + 36{,}450 + 42{,}000 + 25{,}500}{4} = 41{,}000$ pounds

Lesson 3 Exploring Median, Mode, and Outliers

1 Find the mode for each of the following sets of values:

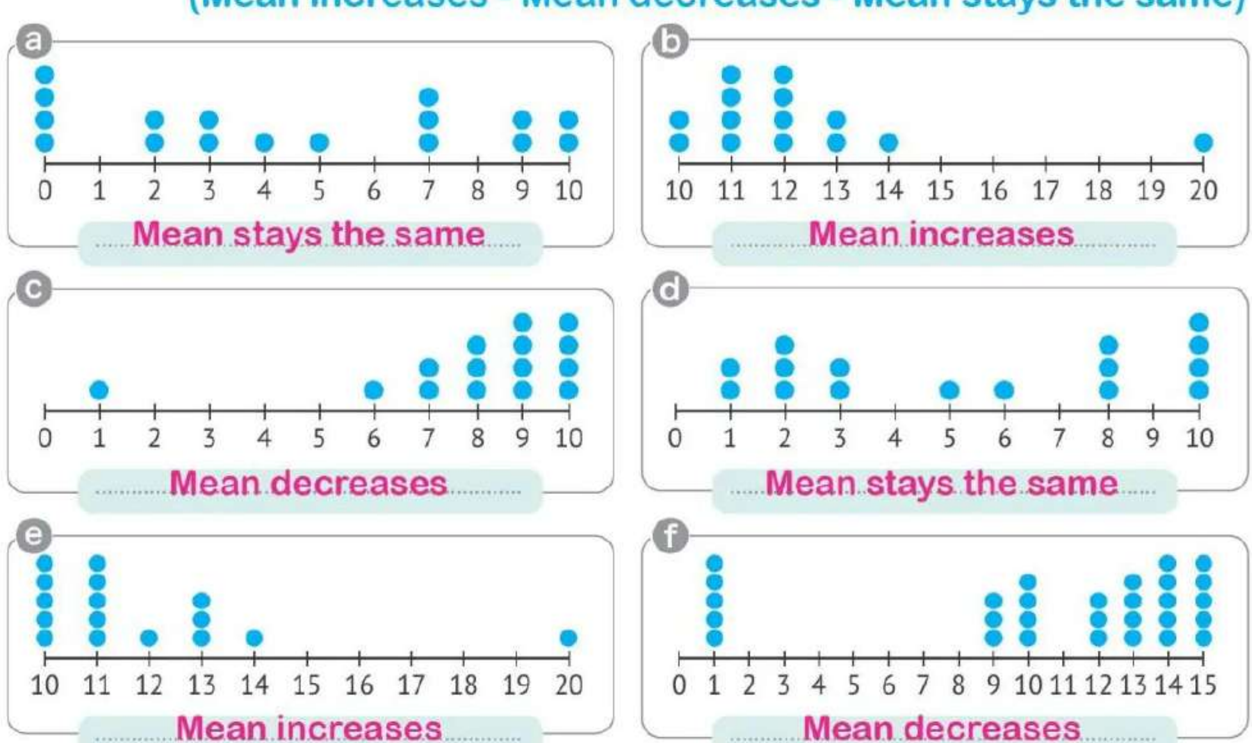
	Values	Mode
a	6 , 7 , 8 , 6 , 5	6
b	9 , 5 , 5 , 9 , 7 , 3	5 , 9
c	4 , 9 , 1 , 0 , 8	None
d	9 , 3 , 2 , 9 , 3 , 9 , 7	9
e	12 , 18 , 19 , 22 , 12 , 12	12
f	10 , 19 , 17 , 16 , 15	None
g	1 , 2 , 8 , 9 , 1 , 3 , 1	1
h	3 , 0 , 8 , 2 , 9 , 30	None
i	3 , 3 , 5 , 3 , 6 , 6 , 6	3 , 6
j	4 , 14 , 24 , 42 , 41 , 44	None

2 List the outliers in each of the following values:

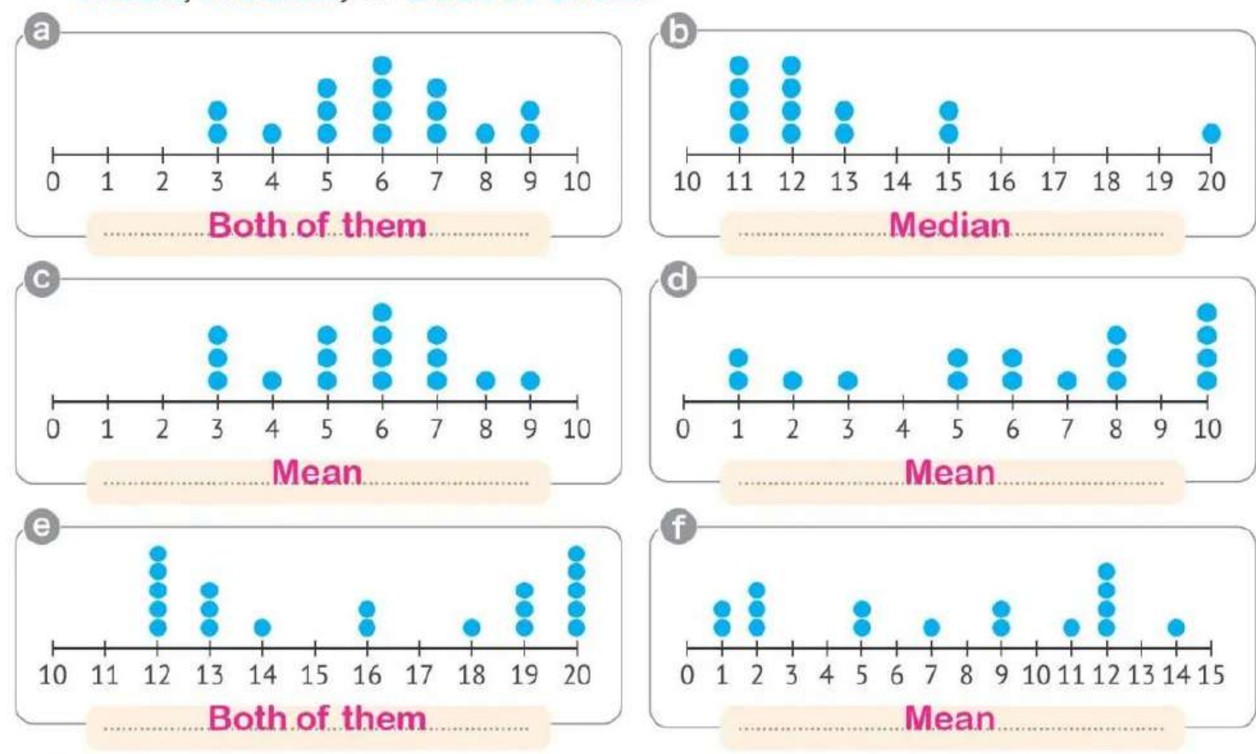
	Values	Outliers
a	6 , 8 , 28 , 7 , 5	28
b	25 , 30 , 27 , 2 , 29	2
c	24 , 24 , 200 , 25 , 26	200
d	45 , 52 , 63 , 4 , 59	4
e	25 , 24 , 25 , 26 , 24 , 26	None
f	142 , 125 , 130 , 135	None
g	11 , 9 , 10 , 50 , 12 , 9 , 51	50 , 51
h	63 , 75 , 219 , 56 , 72 , 220	219 , 220
i	0 , 3 , 6 , 7 , 5 , 1 , 6	None
j	100 , 150 , 50 , 200 , 100 , 150	None



3 **Choose the correct description that applies to each graph below.**
(Mean increases - Mean decreases - Mean stays the same)



4 **For each of the following data representation charts, choose the measure of central tendency that you think would be best used, mean, median, or both of them.**



5 Complete the following table using the dot plot graph for each of the following,

	Graph	Mean	Median	Mode	Outliers
a	Dot plot (0–10)	8	9	9 , 10	1
b	Dot plot (10–20)	14	14	11	none
c	Dot plot (5–15)	9	8.5	7	14
d	Dot plot (20–30)	27	27.5	30	20 , 21

6 Complete the following:

a) The mode of a set of data is ......the most common value...... in that set.

b) The mode of the values (9, 2, 6, 7, 2, 8) is ....2............ .

c) The outlier in the set of values (9, 8, 7, 25, 6) is ....25............ .

d) The mean increases if the outliers are ......more...... than the other values.

e) The mean is ......decreases...... if the outliers are less than the other values.

f) The mean is ......affected...... by the outliers in the data set.

g) The median is ......not affected...... by the outliers in the data set.

h) If the graph is skewed to one side, then ....Median............ . will be the best choice as a measure of the center.

i) If the graph is evenly distributed, then ....mean............ will be the best choice as a measure of the center.

Assessment on Lesson 3

Unit 7

1 Complete the following:

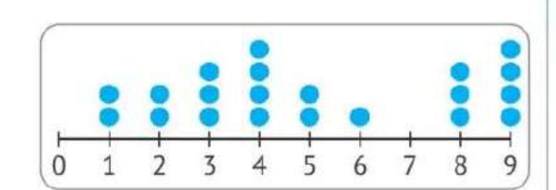
ⓐ The mode of the values (3, 25, 15, 5, 3) is ......3...... .

ⓑ The mode of the values (pen, ruler, eraser, pen, ruler, pen) is ...pen... .

ⓒ If the mode of the set of values (6, 2, 4, x, 3) is 6, then x = ...6.... .

ⓓ ...Mean... is affected by the outliers in the data set.

ⓔ ...Mean... will be the best choice as a measure of the center in the opposite graph (mean or median).

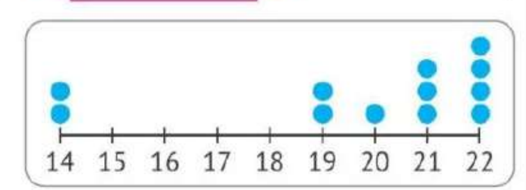


2 Choose the correct answer:

ⓐ The values (5, 3, 2, 5, 2, 7) have ....

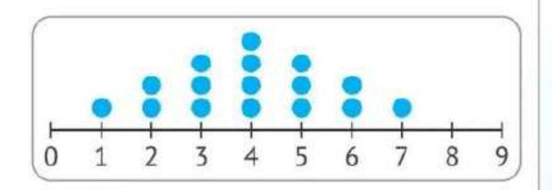
(no mode or one mode or two modes or three modes)

ⓑ The correct description that applies to the opposite graph is that the mean ....



(increases or decreases or remains the same)

ⓒ .... will be the best choice as a measure of the center in the opposite graph.



(The mean or The median or The mode or Both mean and median)

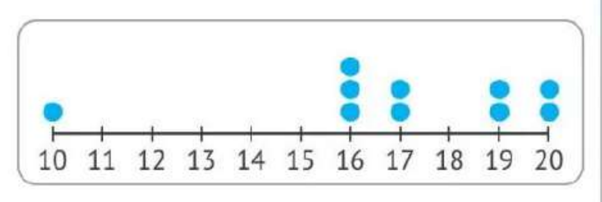
3 Answer using the following graph:

ⓐ Mean: ....17..........

ⓑ Median: ....17..........

ⓒ Mode: ....16..........

ⓓ Outliers: ....10..........

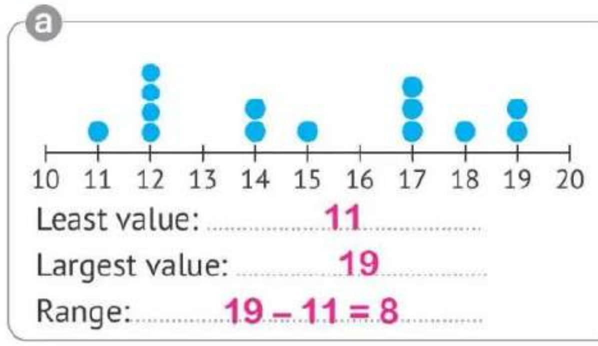


Lesson 4 Exploring the Range

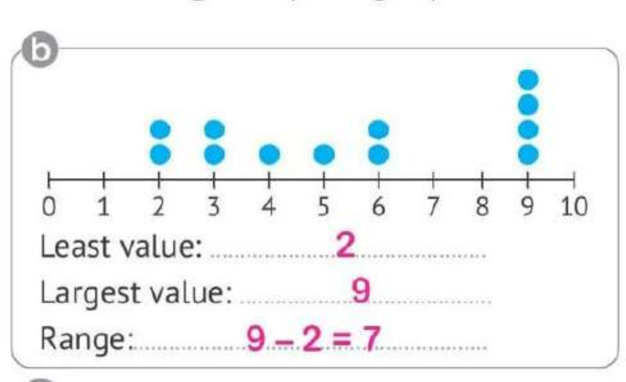
1 Find the range for each of the following sets of values:

	Values	Range
a	45 , 25 , 13 , 30 , 35	45 – 13 = 32
b	11 , 45 , 17 , 25 , 13	45 – 11 = 34
c	6 , 2 , 7 , 7 , 5 , 3	7 – 2 = 5
d	9 , 2 , 7 , 6 , 3 , 4 , 9	9 – 2 = 7
e	15 , 36 , 70 , 25 , 12	70 – 12 = 58
f	7 , 9 , 2 , 7 , 2 , 7 , 2 , 5	9 – 2 = 7
g	66 , 25 , 66 , 15 , 66	66 – 15 = 51

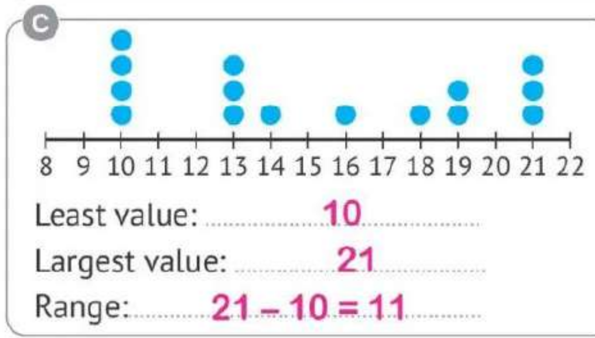
2 Find the range using each of the following dot plot graphs:

a


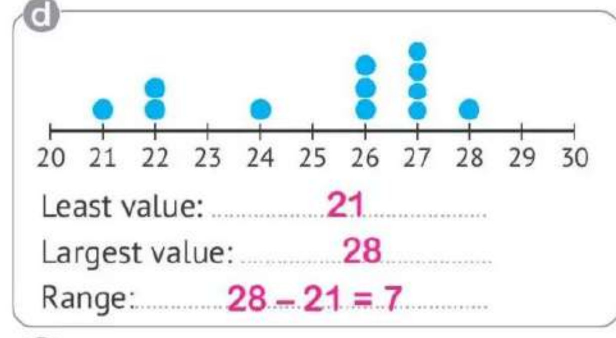
Least value: 11
Largest value: 19
Range: 19 – 11 = 8

b


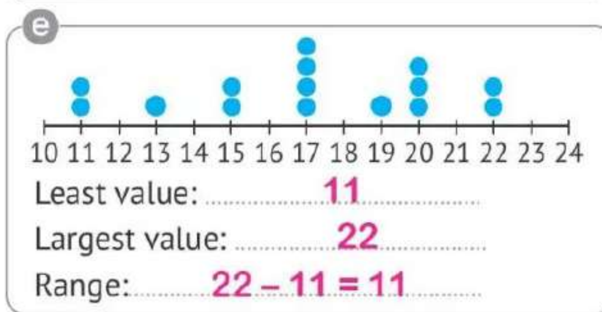
Least value: 2
Largest value: 9
Range: 9 – 2 = 7

c


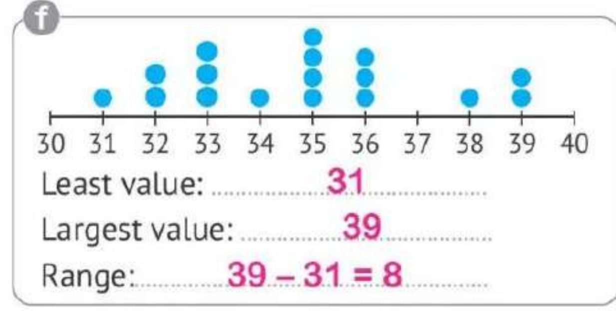
Least value: 10
Largest value: 21
Range: 21 – 10 = 11

d


Least value: 21
Largest value: 28
Range: 28 – 21 = 7

e


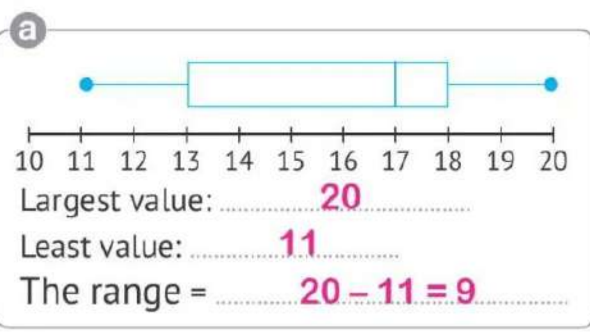
Least value: 11
Largest value: 22
Range: 22 – 11 = 11

f


Least value: 31
Largest value: 39
Range: 39 – 31 = 8

3 Find the range using each of the following box plots:

a

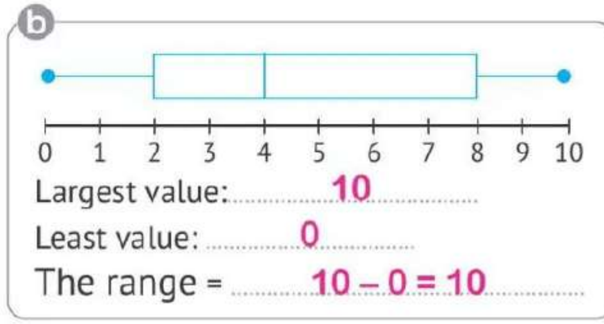


Largest value: 20

Least value: 11

The range = 20 – 11 = 9

b

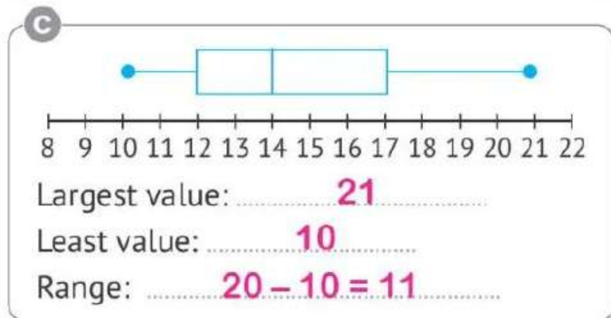


Largest value: 10

Least value: 0

The range = 10 – 0 = 10

c

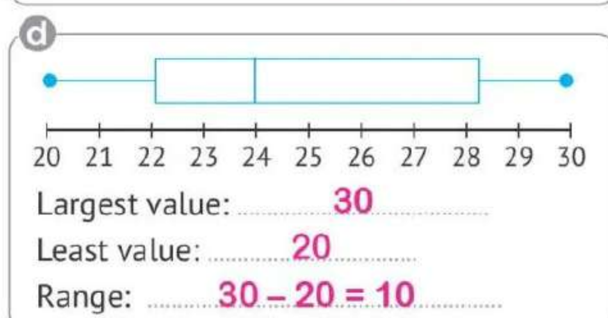


Largest value: 21

Least value: 10

Range: 20 – 10 = 11

d

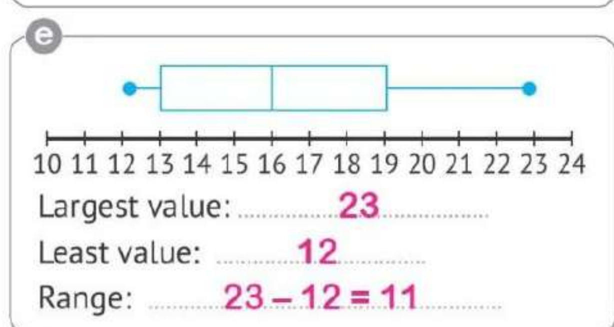


Largest value: 30

Least value: 20

Range: 30 – 20 = 10

e

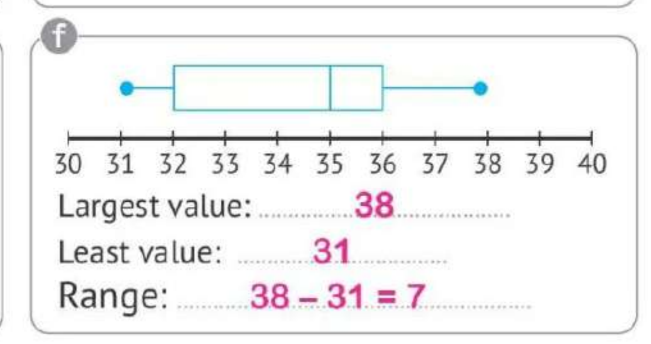


Largest value: 23

Least value: 12

Range: 23 – 12 = 11

f



Largest value: 38

Least value: 31

Range: 38 – 31 = 7

4 Find the range in each of the following:

a The following table shows the ages of a group of friends:

Name	Majed	Tawfiq	Rami	Malik	Mahmoud
Ages	15	11	18	13	14

Largest value: 18 Least value: 11 Range: 7

b The following table shows the amounts saved by Lamia over the past 5 months:

Month	First	Second	Third	Fourth	Fifth
The amount in pounds	120	135	200	85	115

Largest value: 200 Least value: 85 Range: 115

ⓒ The following table shows the number of visitors to an exhibition for 5 days:

Day	Sunday	Monday	Tuesday	Wednesday	Thursday
Number of visitors	1,200	2,000	3,400	3,000	3,600

Least value: 1,200 Largest value: 3,600

Range: 3,600 – 1,200 = 2,400

ⓓ The following table shows the number of students in each class in a school:

Class	First	Second	Third	Fourth	Fifth	Sixth
Number of students	280	275	250	260	224	215

Least value: 215 Largest value: 280

Range: 280 – 215 = 65

5 Complete the following

ⓐ Range = Maximum value – Minimum value .

ⓑ It is easier to find the range using a box plots or dot plots .

ⓒ The range cannot be found using histogram .

ⓓ The range for the values "9, 2, 4, 1, 8, 5" is 8 .

ⓔ If the largest value is 15, and the least value is 3, then the range = 12

ⓕ If the range of a set of values is 12 and the smallest value is 5, then the largest value is 17

ⓖ If the range of a set of values is 25 and the largest value is 52, then the smallest value is 27

ⓗ Range is .... by outliers in the data set (affected , unaffected).

ⓘ It is easier to find the range using a dot plot or box plot because each of them explains largest and smallest value .

ⓙ The range is a measure of spread .

Assessment on Lesson 4

1 Complete the following:

ⓐ ...Range... is the difference between the highest value and the lowest value.

ⓑ The range for the values "3, 7, 9, 5, 8, 7" is ......6...... .

ⓒ If the range of a set of values is 15 and the largest value is 36, then the smallest value is ......21...... .

ⓓ It is easier to find the range using a dot plot or box plot. because each of them explains ...largest... and ...smallest value

2 Choose the correct answer:

ⓐ If the largest value is 18 and the least value is 6, then the range is ....
(12 or 24 or 3 or 78)

ⓑ If the range of a set of values is 11 and the smallest value is 7, then the largest value is ....
(4 or 18 or 77 or 70)

ⓒ All of the following are measures of the central tendency, except ....
(mean or median or mode or range)

ⓓ The range cannot be found using the ....
(dot plot or box plot or histogram or bar chart)

3 The following dot plot shows the total points Jalal scored in each basketball game this season, complete:

The Total points

10 12 14 16 18 20 22 24 26 28 30

Points

ⓐ Least value: ......11......

ⓑ Largest value: ......28......

ⓒ Range: ...28 – 11 = 17

ⓓ The mean: ......21......

ⓔ The median: ......21.5......

ⓕ The mode: ......18......

Assessment on Unit 7



First: **Choose the correct answer:**

a) If the mean of a set of values is 7 and the number of these values is 9, then the sum of the values is .... (16 or 63 or 2 or 9)

b) If the mean of a set of values is 8 and the sum of these values is 48, then the number of these values is equal to .... (6 or 40 or 56 or 8)

c) .... is not affected by outliers in the data set.

(The mean or The mode or The median or All of them)

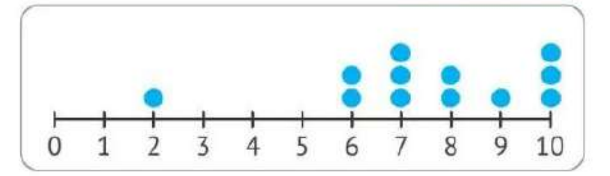
d) The range cannot be found using ....

(the dot plot or the histogram or the box chart or all of them)

e) .... is one of the measures of spread.

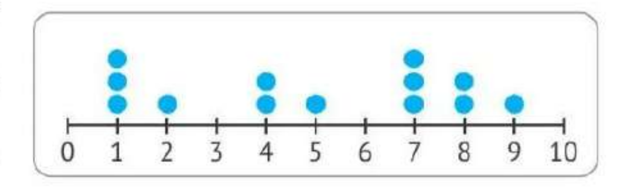
(The mean or The median or The mode or The range)

f) The correct description that applies to the opposite graph is that the mean ....



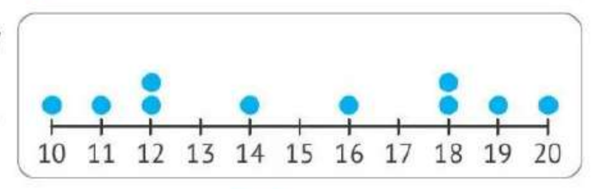
(increases or decreases or remains the same or The range)

g) The beast choice as a measure of central tendency for the values represented In the opposite graph is ....



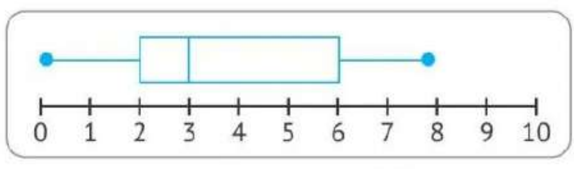
(the mean or the median or the mode or both the mean and the median)

h) The mean of the values represented by the opposite dot plot graph is ....



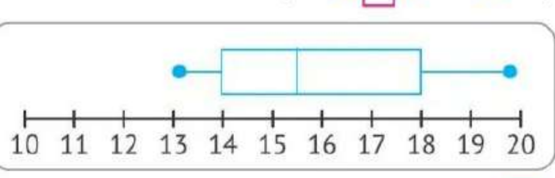
(15 or 20 or 14 or 16)

ⓘ The median of the values represented by the opposite box plot graph is ....



(2 or **3** or 6 or 8)

ⓙ The range of values represented on the opposite box plot is ....



(4 or 18 or 5 or **7**)

Second: Answer the following:

ⓐ The mean of the values: 9, 7, 3, 1, 8, 2 is ..... 5 .....

ⓑ The mode of the values 5, 3, 8, 7, 3, 5 is ..... 3 , 5 .....

ⓒ The range for the values: 15, 5, 17, 3, 12 is ..... 14 .....

ⓓ The outliers in the set of values: 5, 18, 3, 4, 7, 6 are ..... 18 .....

ⓔ ..... mean ..... and ..... range ..... are affected by the presence of outliers.

Third: Answer the following:

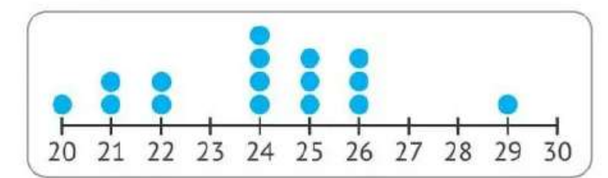
1 Using the corresponding graph (answer).

ⓐ The mean: ..... 24 .....

ⓑ The median: ..... 24 .....

ⓒ The mode: ..... 24 .....

ⓓ The range: ..... 9 .....



ⓔ Outliers: ..... 29 .....

2 The following table represents the temperatures recorded in a city in a week:

Day	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature	26°	25°	30°	25°	23°	24°	22°

Using the values shown table, find:

ⓐ The mean: ..... 25 .....

ⓑ The median: ..... 25 .....

ⓒ The mode: ..... 25 .....

ⓓ The range: ..... 8 .....

ⓔ Outliers: ..... 30 .....

Accumulative Assessment on



Units 1–7

First: **Choose the correct answer:**

a) The GCF of 9 and 8 is .... (9 or 8 or **1** or 72)

b) $1\frac{3}{4} + 2\frac{1}{2} =$ .... (**$4\frac{1}{4}$** or $3\frac{1}{4}$ or $3\frac{4}{6}$ or 4)

c) The rational number $-2\frac{3}{4}$ is between the two whole numbers ....

(−1 , −2 or **−2 , −3** or 1 , 2 or 2 , 3)

d) Twice the sum of 7 and x is ....

($2x + 7$ or **$2(x + 7)$** or $27 + x$ or $2(2x + 7)$)

e) .... may use separate columns to represent the data.

(Dot plots or **Bar graphs** or Double bar graphs or Histograms)

Second: **Complete the following:**

a) The smallest two-digit prime number is ....11.... .

b) The additive inverse of 5.9 is ....-5.9.... .

c) The variable in the term "2.5 x" is ....x.... .

d) The inequality that represents all values "greater than −1" ....$x > -1$.... .

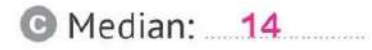
e) $z + 5 = m$: independent variable is ....z.... , dependent variable is ....m.... .

Third: **Answer the following:**

1. Use the following box plot to complete:

a) Maximum value: ....21....

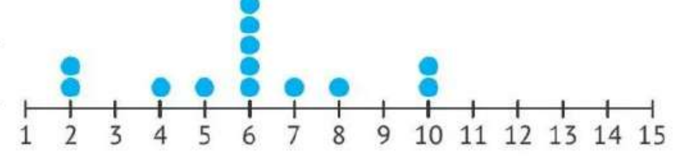
b) Minimum value: ....10....



c) Median: ....14....

d) Range: ....11....

2. Use the following dot plot to complete:



a) Maximum value: ....10....

b) Minimum value: ....2....

c) Median: ....6....

d) Mean: ....6....

e) Range: ....8....

Final Revision



First: **Choose the correct answer:**

1. Any number can be divided by another if the remainder of the division operation is .... (1 or 2 or 3 or [0])
2. All even numbers are divisible by .... ([2] or 3 or 5 or 6)
3. A number is divisible by 3 if the sum of its digits is a multiple of .... (2 or [3] or 5 or 6)
4. A number is divisible by 4 if the Ones and Tens digits of the number are divisible by .... (1 or 2 or 3 or [4])
5. If the Ones digit of a number is 0 or 5, then the number is divisible by .... (2 or 3 or 4 or [5])
6. 26 is divisible by .... ([2] or 3 or 4 or 6)
7. .... is divisible by 3. (133 or 236 or 304 or [213])
8. The smallest number which is divisible by 2 and 3 is .... (5 or [6] or 8 or 9)
9. The smallest number which is divisible by 2 and 5 is .... ([10] or 2 or 5 or 7)
10. The smallest 2-digit number which is divisible by 6 is .... (18 or 24 or [12] or 30)
11. 30 is divisible by 6 because 6 x .... = 30 (3 or [5] or 4 or 6)
12. The number 4,101 is divisible by .... (2 or [3] or 4 or 5)
13. .... is divisible by 2 and 3. (23 or [18] or 8 or 21)
14. The number 108 is divisible by the two prime numbers 3 and .... ([2] or 5 or 7 or 11)
15. The smallest number that could be added to 72 to be divisible by 5 is .... (1 or 2 or [3] or 4)

16 The smallest number that could be added to 36 to be divisible by 10 is .... (1 or 2 or 3 or [4])

17 The smallest number that could be added to 83 to be divisible by 3 is .... ([1] or 2 or 3 or 4)

18 .... is a factor of all numbers. (0 or [1] or 2 or 3)

19 The prime factors of 12 are ....
(2 x 6 or 3 x 4 or [2 x 2 x 3] or 1 x 12)

20 The LCM of any two prime numbers is ....
(0 or 1 or their sum or [their product])

21 The LCM of a relatively prime numbers is ....
(0 or 1 or its sum or [their product])

22 The GCF of the numbers 4 and 15 is .... (0 or [1] or 4 or 5)

23 The numbers 6 and .... are relatively prime numbers.
(4 or 15 or [35] or 20)

24 .... is a prime number. (55 or [11] or 22 or 33)

25 The numbers 0 , 6 , 8 , 2 are .... numbers.
([even] or odd or prime or composite)

26 The prime factors of 20 are ....
(2 x 10 or 5 x 4 or [2 x 2 x 5] or 1 x 20)

27 The GCF of any two prime numbers is ....
(0 or [1] or their sum or their product)

28 If the prime factors of a number are 2 x 3 x 3, then the number is .... ([18] or 9 or 11 or 233)

29 The LCM of the numbers 8 and 5 is .... (8 or 5 or 13 or [40])

30 The GCF of a number whose prime factors are 2 x 5 and a number whose factors are 3 x 7 is .... (0 or 10 or [1] or 210)

31 $6 \times (7 + 5) =$ ....

((6 x 7) +(6 x 5) or 6 x 7 + 5 or 6 x 7 x 5 or (6 + 7) x (6 + 5))

32 $(2 \times 8) + (2 \times 3) =$ ....

(2 x 8 x 3 or 2 + (8 x 3) or 2 x (8 + 3) or 2 x 8 x 2 x 3)

33 $1\frac{3}{4} + 2\frac{1}{2} =$ ....

($4\frac{1}{4}$ or $3\frac{1}{4}$ or $3\frac{4}{6}$ or 4)

34 The number −3 is located to the right of the number .... on the number line.

(−4 or 4 or −2 or2)

35 The number just comes before .... is −1. (−2 or 2 or 0 or 1)

36 −9 > .... (−15 or 8 or −8 or 10)

37 The opposite of −12 is .... (−12 or 12 or 1 or 2)

38 The number .... is neither a positive nor a negative number.

(0 or 1 or −1 or 10)

39 The opposite of 5 > .... (−4 or 4 or −6 or 6)

40 The largest negative integer is .... (−1 or 1 or −100 or 0)

41 The largest non−positive integer is .... (−1 or 1 or −100 or 0)

42 All negative numbers are .... zero.

(greater than or less than or equal to)

43 All positive numbers are .... zero.

(greater than or less than or equal to)

44 The integer that expresses (the depth of a well of 5 meters) is ....

(−5 or 5 or −10 or 10)

45 The set of counting numbers .... the set of natural numbers.

(belongs to or does not belong to or is a subset of or is not a subset of)

46 An integer between the numbers 2 and −2 is ....

(−1 or −3 or 3 or −4)

47 The number just comes after −9 is .... (−10 or −8 or 10 or 8)

48 −25 ☐ −12 (> or = or <)

49 6 < ………………… .　　(−8 or 8 or −9 or −7)

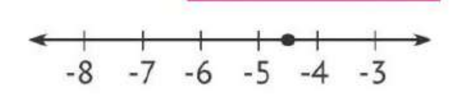
50 − 2.5 belongs to the set of ………………… .

(counting numbers or natural numbers or integers or rational numbers)

51 5 does not belong to the set of ………………… .

(counting numbers or natural numbers or integers or even numbers)

52 The rational number represented on the opposite number line is ………………… .



($4\frac{2}{3}$ or $5\frac{2}{3}$ or $-4\frac{2}{3}$ or $-5\frac{2}{3}$)

53 The rational number represented on the opposite number line is ………… .



(0.5 or −0..5 or 1.5 or −15)

54 0 belongs to the set of ………………… .

(counting numbers or natural numbers or negative integers or odd numbers)

55 The opposite of $\frac{3}{4}$ is ………………… .　　($-\frac{3}{4}$ or $-\frac{4}{3}$ or $\frac{4}{3}$ or $1\frac{1}{3}$)

56 The number −6 in the form $\frac{a}{b}$ is ………………… .　　($-\frac{1}{6}$ or $-\frac{6}{1}$ or $\frac{1}{6}-$ or $\frac{6}{1}$)

57 $\frac{3}{4}$ ☐ $-\frac{5}{3}$　　(> or = or <)

58 $-\frac{7}{4}$ > ………………… .　　($\frac{7}{4}$ or $-1\frac{3}{4}$ or $\frac{8}{4}$ or $-\frac{8}{4}$)

59 " − 2 " belongs to the set of ………………… .

(counting numbers or natural numbers or negative integers or odd number s)

60 All integers are ………………… numbers.

(counting or natural or even or rational)

61 The additive inverse of −5 is ………………… .　　($\frac{1}{5}$ or $-\frac{1}{5}$ or − 5 or 5)

62 The rational number $-2\frac{3}{5}$ is between the two whole numbers ……… .

(− 1 or − 2 and − 3 or − 3 and 1 or 2 and 2 or 3)

63 – 7 is to the right of the number .... on the number line.

(-8 or 8 or -6 or 6)

64 $|-3.7|$ = ...
(3.7 or – 3.7 or 37 or – 37)

65 The absolute value of "zero" is ....
(10 or 0 or –1 or 1)

66 The absolute value of 2.7 is ....
(– 2.7 or 2.7 or 27 or –27)

67 The larger the absolute value, the .... the number is from zero.

(closer or farther or equal to)

68 In the algebraic term "$\frac{3}{8}x$" the variable is ....

(x or 8 or 3 or $\frac{3}{8}$)

69 Like terms for the algebraic expression "5 + 5y + 2y" are ....

(5 , 5 y or 5 y , 2 y or 5 , 2 y or 5 , 5y , 2y)

70 In the algebraic expression "3 y + 9" the constant is ....

(9 or 3 or y or 3 y)

71 If the height of a school building is **m** meters and the height of a tree adjacent to this building is 10 meters less than it, then height of the tree is .... meters.

(m + 10 or m – 10 or 10 m or $\frac{m}{10}$)

72 Ahmed and Tamer have 60 pounds. If what Ahmed has is x pounds, then what Tamer has is .... pounds.

(60 + x or 60 – x or 60 x or 60 ÷ x)

73 If we subtract 5 from the number x, the result is ....

(x + 5 or x – 5 or 5 – x or 5 x)

74 Ziyad saved up x pounds and his father gave him 10 pounds so that he would be with him ....
(x – 10 or x + 10 or 10 x or 10 – x)

75 The algebraic expression representing "subtracting 3 from twice the number x" is ....
(x – 3 or 2 x – 3 or 3 x + 2 or 5 x)

76 The algebraic expression representing: half the difference between the number **a** and 7 is ....

($\frac{1}{2}$ a – 7 or $\frac{1}{2}$ a + 7 or $\frac{1}{2}$ (a – 7) or $\frac{1}{2}$ (a + 7))

77 Basim is x years old now. How old will he be 5 years later? ....

(x – 5 or x + 5 or 5 ÷ x or 5 x)

78 Which of the following operations expresses the mathematical expression 'double the number plus 4'? (+ , – or x , – or x , + or x , ÷)

79 A square of side length **s** cm has a perimeter of .... cm.

(s + 4 or s x 4 or $\frac{s}{4}$ or 4 – s)

80 If the price of one book is 15 pounds, how much is the price of b number of books? .... (15 b or 15 – b or b – 15 or b + 15)

81 4^2 = ... (4 x 2 or 4 x 4 or 4 + 2 or 4 + 4)

82 3^0 = ... (3 or 0 or 1 or 3 x 0)

83 1^5 = ... (1 x 5 or 1 + 5 or 1 or 0)

84 2 x 2 x 2 x 2 x 2 = ... (2^5 or 5^2 or 2 x 5 or 2 + 5)

85 $4^{......}$ = 1 (0 or 1 or 2 or 5)

86 2^4 ☐ 4^2 (< or = or > or ≥)

87 6^0 ☐ 0^6 (< or = or > or ≥)

88 5 x 3 + 2^2 = ... (35 or 19 or 51 or 17)

89 $3^2 + 3^2 + 3^2$ = ... (3^6 or 9^2 or 3^3 or 9^6)

90 If the price of one shirt is 120 Egyptian pounds, then the price of m number of shirts is ....

(120 m or 120 ÷ m or 120 + m or 120 – m)

91 If Hanan saves **d** pounds daily for 5 days, then her father gives her 20 pounds, the amount that Hanan has now is ....

(5 + 20d or 20 – 5d or 5d + 20 or 5 x (d + 20))

92 The value of the expression $a^2 + 2 \times 3$ when a = 3 is ....

(15 or 33 or 12 or 24)

93 If b = 6, then b − .... = 4 (10 or 4 or 2 or 6)

94 If 5 x = 40, then x = ... (35 or 45 or 8 or 200)

95 If y = 6, then $\frac{y}{\dots}$ = 2 (3 or 8 or 12 or 4)

96 The inequality that represents all values greater than −1 is ....

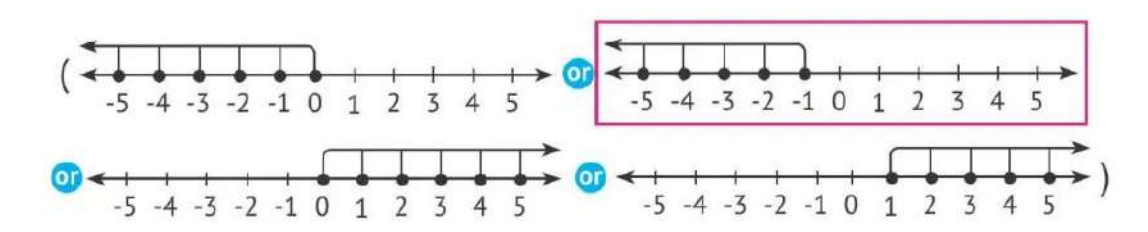
($x > -1$ or $x < -1$ or $x \leqslant -1$ or $x \geqslant -1$)

97 All numbers less than 7 can be written as ....

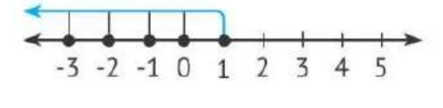
($n \leqslant 7$ or $n \geqslant 7$ or $n < 7$ or $n > 7$)

98 The inequality that represents all values to the left of 5 on a number line is .... ($x > 5$ or $x < 5$ or $x \leqslant 5$ or $x \geqslant 5$)

99 The figure representing the equation "$x < 0$" is ....



100 The inequality that represents the opposite model is ....



($x > 2$ or $x < 2$ or $x > 2$ or $x < 2$)

101 The equation that represents the opposite model is ....



($x + 2 = 9$ or $2x = 9$ or $x - 2 = 9$ or $x + 2 = 9$)

102 The inequality that represents all values less than or equal to −7 is .... ($x > -7$ or $x < -7$ or $x \leqslant -7$ or $x \geqslant -7$)

103 Which of the following values is a solution to the inequality '$x < 9$'? .... (10 or 9.1 or −9.5 or 9)

104 Which of the following values is a solution to the inequality $x \geqslant 5$?

.... (−5 or 4.59 or −25 or 6)

105 The inequality that represents all negative numbers is ....

($x > 0$ or $x < 0$ or $x \leqslant 0$ or $x \geqslant 0$)

106 In " u = 3 ÷ w " the independent variable is ....

(w or u or 3 or w / 3)

107 In a = 5d, the dependent variable is .... (5 or a or d or 5d)

108 If the amount of fuel consumed by the car depends on the distance traveled, then the independent variable is the ....

(fuel amount or distance traveled or traveled time or temperature)

109 If the dependent variable is the student's score in the exam, then the independent variable is ....

(the type of pen used in the solution or the age of the student or the number of correct answers or the number of questions in the exam)

110 The equation that expresses the rule "subtract from 9" is: ....

($y = x - 9$ or $y = 9 - x$ or $y - x = 9$ or $y = 9x$)

111 The rule that represents the equation: $y = \frac{1}{3}x$ is: ....

(Divide by 3 or Multiply by 3 or Divide by $\frac{1}{3}$ or Subtract $\frac{1}{3}$)

112 The rule that represents the equation: $y = (x - 3) \div 2$ is: ....

(Divide by 2, then subtract 3 or Subtract 3, then divide by 2 or Divide by 3, then subtract 2 or Subtract 2, then divide by 3)

113 $y = 6x + 4$ for $x = 3$ then y = ... (10 or 22 or 18 or 67)

114 Statistical question ....

(results in a lot of different answers or its answer is yes or no or has one answer or its answer is one number)

115 .... are categorical data.

(Dates of birth or Ages or Weights or Favourite colours)

116 .... are numerical data.

(Preferred colours or Blood groups or Birthplaces or Ages)

117 All the following data are categorical, except ....

(favourite foods or occupations or weights or eye colours)

118 All the following are numerical data, except ....

(types of pets or test scores or ages or number of pets)

119 The horizontal axis includes numerical periods in ....

(dot plot or bar graph or double bar graph or histogram)

120 .... do not have a vertical axis.

(Dot plots or Bar graphs or Double bar graphs or Histograms)

121 .... use separate columns to represent the data.

(Dot plots or Bar graphs or Double bar graphs or Histograms)

122 .... have horizontal axis.

(Bar graphs or Double bar graphs or Histograms or All of the previous)

123 In the dot plots, ...

(columns are used to represent data or there is no need for a horizontal axis or each information is represented by a point or data is displayed grouped in intervals)

124 In bar graphs, ...

(each bar represents a number or one categorical or it does not need a vertical axis or the bars must touched or each piece of information is represented by a dot)

125 In histograms, ...

(they do not need a vertical axis or the columns must touch or data is shown above the number line or all bars are evenly spaced)

126 In each of the bar graphs and histograms ....

(bars are used to represent data or each bar represents an interval or each bar represents one number or the data is shown above the number line.)

127 In ...., there is a graduated scale for the vertical axis.

(the dot plot only or the bar graph only or the histogram only or both of bar graph and histogram)

128 .... may be used to display numerical data.

(Dot plots or Bar graphs or Histograms or All of the previous)

129 The best graph to represent the number of pupils whose height ranges from 150–160 cm is the ....

(dot plot or bar graph or histogram)

130 The .... has two axes "horizontal and vertical".

(bar graph or double bar graph or histogram or all of the previous)

131 The bar graph ....

(can display numerical and categorical data or can display only numerical data or can display only categorical data.)

132 The mean of the values: 45 , 15 , 40 , 70 , 80 is ....

(40 or 45 or 50 or 60)

133 If the mean of the values: 12 , 15 , x , 8 is 10, then the value of x is: ....

(40 or 5 or 20 or 10)

134 If the sum of 8 values equals 48, then the mean of these values is ....

(40 or 56 or 24 or 6)

135 If the sum of a set of values is 36 and the mean of these values is 6, then the number of these values is ....

(6 or 42 or 30 or 216)

136 The median of the values: 4 , 9 , 7 , 1 , 1 , 2 is ....

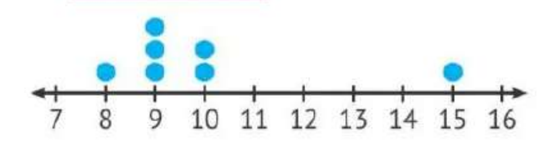
(4 or 2 or 3 or 24)

137 If the mean of Manal and Siham's ages is 7 years and Manal's age is 8 years, then Siham's age is .... years. (**6** or 7 or 8 or 15)

138 The values "5 , 3 , 2 , 5 , 2 , 7" have ....

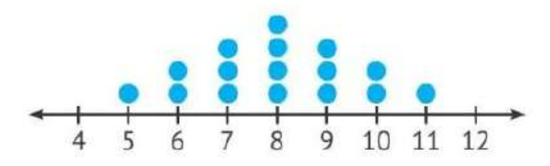
(no mode or one mode or **two modes** or three modes)

139 The correct description that applies to the opposite graph is the mean ....



(**increases** or decreases or remains the same)

140 .... will be the best choice as a measure of the center in the opposite graph.



(The mean or The median or The mode or **Both the mean and median**)

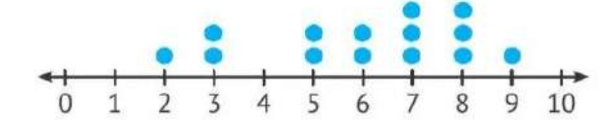
141 All the following are measures of the center, except the ....

(mean or median or mode or **range**)

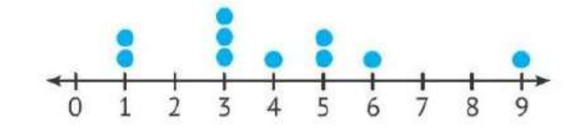
142 The range cannot be found using the ....

(dot plot or box plot or **histogram** or bar chart)

143 The mean of the values represented on the opposite dot plot is ....(14 or **6** or 7 or 6.5)

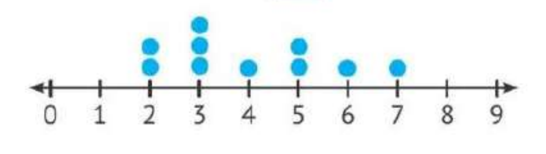


144 The median of the values represented on the opposite dot plot is ....



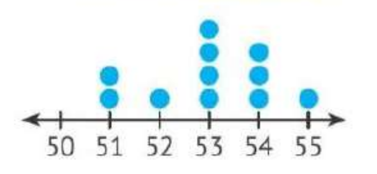
(3 or **3.5** or 4 or 4.5)

145 The range of the values represented on the opposite dot plot is ....



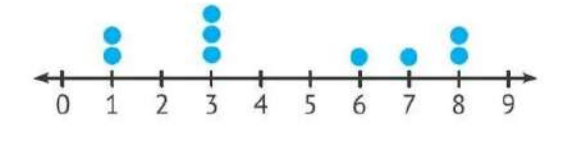
(8 or 7 or 10 or **5**)

146 The mode of the values represented on the opposite dot plot is ....



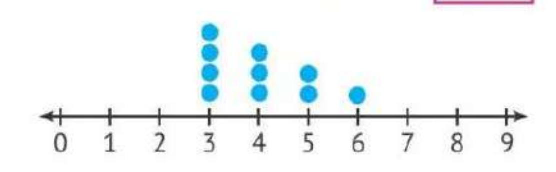
(51 or 52 or 53 or 54)

147 The outliers of the values represented on the opposite dot plot is ....



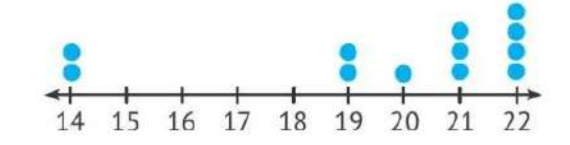
(2 or 7 or 3 or none)

148 The .... will be the best choice as a measure of the central tendency in the opposite graph.



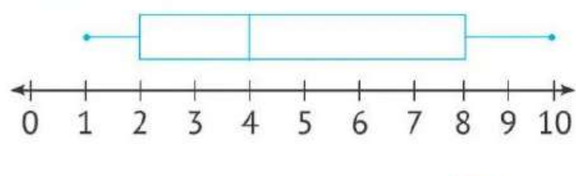
(mean or mode or median or range)

149 The correct description that applies on the opposite graph is the mean ....



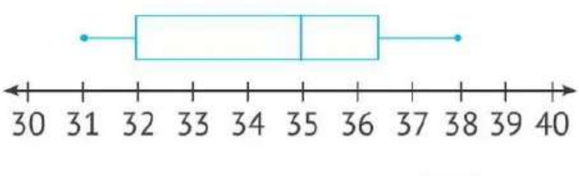
(increases or decreases or remains or the same)

150 The range of the values represented on the opposite box plot is ....



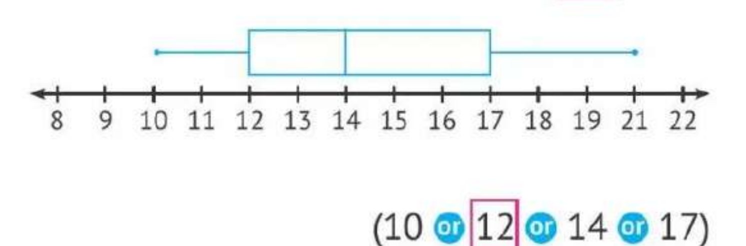
(10 or 2 or 9 or 8)

151 The median of the values represented on the opposite box plot is ....



(31 or 32 or 35 or 38)

152 The lower quartile of the values represented on the opposite box plot is ....



(10 or 12 or 14 or 17)

153 The number of integers on the number line is ....

(100 or 2 or infinite or 1)

154 .... data is written in the form of words.

(Numerical or Category or Mean or Histogram)

155 Eight squared is .... (3^8 or 4^8 or 8^2 or 2 x 8)

156 The best subset for $\frac{1}{5}$ is the set of .... numbers.

(counting or integer or natural or rational)

157 The type of graph that represents individual data values is the ....

(bar graph or histogram or box plot or dot plot)

158 The first operation you perform in $20 \div 5 + (7 - 2)^2$ is ....

(adding or subtracting or exponent or dividing)

159 The ordered pair (0 , ...) satisfies the equation y = 3x + 4.

(7 or 3 or 4 or 0)

160 All the following expressions are equivalent, except ....

(4x + 8 or 2 (2x + 4) or 4 (x + 4) or 4 (x + 2))

Second: Complete the following:

1. The smallest number divisible by both 5 and 3 is ....15.... .
2. Any number is divisible by 2 if it is an ....even.... number.
3. Any number is divisible by 3 if the sum of its digits is a multiple of ....3.... .
4. 4 is a factor of 28, then ....28.... is divisible by ....4.... .
5. If the Ones digit of a number is 0 or 5, then the number is divisible by ....5.... .
6. 36 is a multiple of 9, then ....36.... is divisible by ....9.... .
7. The smallest number which is divisible by both 5 and 6 is ....30.... .

8 Name three number are divisible by 2, 3 and 5: ......30...... , ...60...... , ...90...... .

9 All even numbers are divisible by ....2.......... .

10 The prime number has ....2.......... factor(s).

11 All prime numbers are odd numbers, except ....2.......... is an even.

12 ....2.......... is the smallest prime number.

13 ....3.......... is the smallest odd prime number.

14 The GCF of the two relatively prime numbers is ....1.......... .

15 The LCM of the two relatively prime numbers is ...their product

16 The prime factors of 28 are .2 , 2 , 7...... .

17 5 x (3 + 6) = (..........5.......... x ....3..........) + (..........5.......... x ....6..........)

18 ....9.......... x (4 + 6) = (9 x ....4..........) + (9 x ....6..........)

19 The number and its opposite are on ....the same distance....... from zero, but on two opposite... sides on the number line.

20 A set of rational numbers is ...not a subset... of a set of integer numbers.

21 The opposite of "10" is ....-10........ .

22 The additive inverse of -8 is ....8.......... .

23 The additive inverse of ....0.......... is itself.

24 The smallest counting number is ....1.......... .

25 The smallest natural number is ....0.......... .

26 The greatest non-positive integer is ....0.......... .

27 The greatest negative integer is ....-1.......... .

28 The smallest non-negative integer is ....0.......... .

29 The number just come before - 9 is ....-10........ .

30 Integers between − 3 and 2 are .-2 , -1 , 0 , 1

31 A set of counting numbers is a subset of a set of ...Natural number... numbers, a set of ...Integers..., and a set of ...Rational number... numbers.

32 The rational number "−7.2" lies between ....-8.......... and ....-7.......... .

33 A set of integers is a subset of a set of ....Rational....... numbers.

34 A set of natural numbers is a subset of a set of .....integers......, and a set of ....rational........ numbers.

35 -2.5 in the form $\frac{a}{b}$ is ......$-\frac{25}{10}$........ .

36 -5 is located to the right of the number ....-6.......... on the number line.

37 If $5 = |a|$, then a = ...5........... or ....-5.......... .

38 $-|-4| =$ ....-4............. .

39 Opposite numbers on the number line have .the same absolute values.

40 The coefficient in the algebraic term "3x y" is ....3............ .

41 The constant in the expression $3y + 2x - 5$ is ....-5............ .

42 The number of terms in the algebraic expression $3xy - 25$ is ....2........ .

43 The constant in the algebraic expression $5b + 3.2$ is ....3.2........... .

44 The algebraic expression that expresses "three times b" is ....3b............. .

45 The algebraic expression that expresses adding "z" to 36 is ....z + 36...... .

46 The algebraic expression that expresses 5 less than "x" is ....$x - 5$......... .

47 The verbal form for the algebraic expression $2 \times (a + 7)$ is 2 times the sum of a and 7 .

48 If the side length of a square is "s" cm, then the perimeter of the square = ...4s.......... .

49 The value of the expression r^2 if (r = 9) is ....81............ .

50 The value of the expression "$3(y^2 + 2)$ (if y = 3)" is ....33.......... .

51 The value of the expression $3(2h - 3) + 2$ at h = 2.5 is ....8............ .

52 The algebraic expression that represents "twice of subtracting 5 from the number "w" is ....2 X (w – 5).................. .

53 In ....4^2.............., 4 is called the base and 2 is called the exponent.

54 Six cubed = ...6^3........... .

55 Seven squared = ...7^2............ .

56 If $3^x = 81$, then the value of x is ....4............. .

57 $3 \times 3 \times 3 \times 3 \times 3 \times 3 =$ ...3^6... .

58 Using the opposite model: the equation is ......$x + 1 = 8$...... .



59 Murad and Farida have 70 pounds, if what Murad has is k pounds, then what Farida has is ......70 – K...... pounds.

60 Eslam is x years old now, how old will he be after 6 years is ......$x + 6$...... .

61 If $x + 3 = 8$, then x = ...5...... .

62 If $y - 2 = 9$, then y = ...11...... .

63 If $8\ m = 16$, then m = ...2...... .

64 If $\frac{1}{3}n = 3$, then n = ...9...... .

65 The inequality that represents all values less than -6 is ......$x < -6$...... .

66 The inequality that represents all values to the right of -9 on the number line are: ......$x > -9$...... .

67 The inequality that represents all values greater than or equal 2 is......$x \geq 2$...... .

68 Write the inequality that represents counting numbers ..$x > 0$ or $x \geq 1$

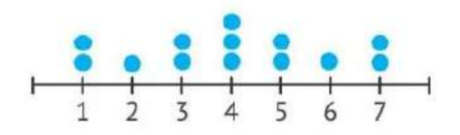
69 In the equation $m - 8 = a$, the independent variable is ......m...... .

70 If the equation is "$y = x + 4$", then the rule is ......add 4...... .

71 "Do you like the red color?" is a ......non-statistical...... question.

72 ......Dot plots...... does not have vertical axis.

73 In the opposite figure, the ...Both means and median... will be the best choice as a measure of central tendency.



74 The graph which makes it easier to see the median is ......box plots...... .

75 ......weight...... , ...age...... are numerical data

76 The mean of the values "8 , 9 , 2 , 7 , 6 , 4 ,6" is ......6...... .

77 The median of the values "8 , 2 , 10 , 1 , 3 , 7 , 2" is ......3...... .

78 The mode of the values "9 , 2 , 8 , 3 , 7 , 3 " is ......3...... .

79 If the sum of a set of values is 36, and the mean of these value is 4, then the number of these value is ......9...... .

80 The best graph to represent the number of students absent on Monday is ......bar graph...... .

81 The upper quartile of the values: 2 , 1 , 3 , 5 , 8 , 1 , 7 , 6 is ......6.5...... .

82 The lower quartile for the set of data : 72 , 64 , 79 , 63 , 60 , 75 , 70 , 61 , 77 is ......62...... .

83 Range = ...maximum value...... – ......minimum value...... .

84 The range cannot be found using ......histogram...... .

85 The range for the values "9, 2, 4, 1, 8, 5" is ......8...... .

86 If the mean of the values is 3, 4, 6, x, 7 is 6, then the value of x is ......10...... .

87 The outliers in the set of values 5, 18, 3, 4, 7, 6 are ......18...... .

88 ......Mean...... and ......range...... are affected by the presence of outliers.

89 If the range of a set of values is 25 and the largest value is 52, then the smallest value is ......27...... .

90 If the range of a set of values is 12 and the smallest value is 5, then the largest value is ......17...... .

Third: Answer the following:

1 Murad has 340 books, Can he make sets of 5 books each without any books remaining? why?

......Yes, because 340 is divisible by 5......

2 Farida made 78 string stars using jute twine. If she wants to sell them all in sets of 3, will there be any jute decorations left? why?

......No, because 78 is divisible by 3......

3 Omar has 208 candles, which he must decorate a number of tables with. If he uses 4 candles to decorate each table, will there be any candles left?

No, because 208 is divisible by 4

4 **Complete using the venn diagram:**

12 | 45

2, 2 | 3 | 3, 5

a The two numbers represented on the Venn digram are ....12.... and ....45.... .

b The common prime factors of the two numbers are ....3.... .

c The GCF of the two numbers is ....3.... .

d The LCM of the two numbers is ....180.... .

e Are the two numbers relatively prime numbers? (Yes or **No**)

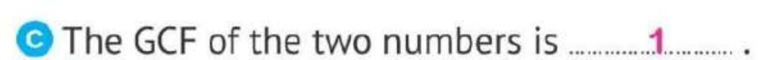
5 **Complete using the venn diagram:**

a The two numbers represented on the Venn digram are ....10.... and ....21.... .

10 | 21

5, 2 | | 3, 7

b The common prime factors of the two numbers are ....none.... .



c The GCF of the two numbers is ....1.... .

d The LCM of the two numbers is ....210.... .

e Are the two numbers relatively prime numbers? (**Yes** or No)



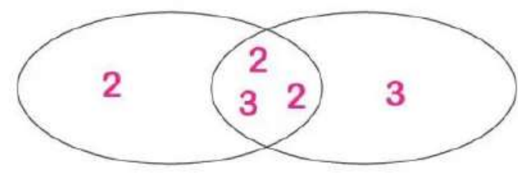
6 Karim has 48 pencils and 18 crayons. What is the numerical expression of the greatest number of sets that can be made so that all sets include the same number of items?

$(6 \times 8) + (6 \times 3) = 6 \times (8 + 3)$

7 A merchant has 16 kg of oranges and 24 kg of apples, so if the merchant wants to divide the oranges and apples in bags of the same mass, write a numerical expression that expresses what is the largest number of bags that can be made for each type of fruit.

$(8 \times 2) + (8 \times 3) = 8 \times (2 + 3)$

8 Find the GCF and LCM using the Venn diagram for numbers 24 and 36:



GCF = $2 \times 2 \times 3 = 12$

LCM = $2 \times 2 \times 2 \times 3 \times 3 = 72$

9 Arrange each group of the following numbers in ascending and descending order:

$8, -17, |-3|, -9, |12|$

Ascending order: -17 , -9 , $|-3|$, 8 , $|12|$

Descending order: $|12|$, 8 , $|-3|$, -9 , -17

10 Find the value of the algebraic expression in each of the following:

a) $4a - 15 \div 3$ [If $a = 2$] $4 \times 2 - 15 \div 3 = 8 - 15 \div 3 = 8 - 5 = 3$

b) $(6b + 3) \div 7$ [If $b = 3$] $(6 \times 3 + 3) \div 7 = (18 + 3) \div 7 = 21 \div 7 = 3$

c) $g^2 - 32 \div 8$ [If $g = 5$] $5^2 - 32 \div 8 = 25 - 32 \div 8 = 25 - 4 = 21$

11 Write a mathematical expression that expresses each of the following situations:

a) Bassem runs one kilometer in 15 minutes. The time that Bassam needs to run "t" km is $15t$.

b) Hala receives a daily wage of "p" pounds. If her expenses in 10 days amounted to 325 pounds. The amount remaining with her in 10 days is $10p - 325$.

12 Diaa saves 150 pounds every month from expenses, so if the amount that he saves in (x) month is (y) pounds, then:

a The equation that represents this situation is ....y = 150x....... .

b The independent variable is ....x.......... .

c The dependent variable is ....y.......... .

d What Diaa saves in a year is ......y = 150 X 12 = 1,800 pounds...... .

13 If Hazem owns a discount card of 50 pounds. Complete:

a The equation represents the relationship between Hazem's purchases amounted (x) pounds, and the amount to be paid after the discount (y) pounds is .y = x – 50. .

b The independent variable is ....x........ .

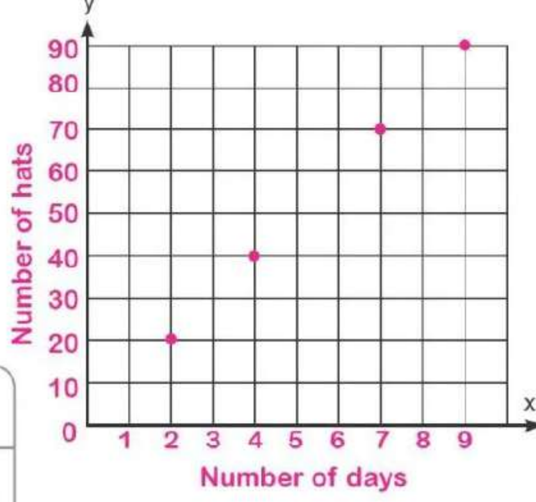
c The dependent variable is ....y........ .

d The required amount if the purchase price before the discount is 420 pounds is ....y = 420 – 50 = 370.......... .

14 Omar manufactures hats, producing 10 hats per day. Complete the following table representing the number of working days (x) and the number of hats produced (y).

Write an equation that shows the relationship between the variables (x) and (y) and then represent it graphically.

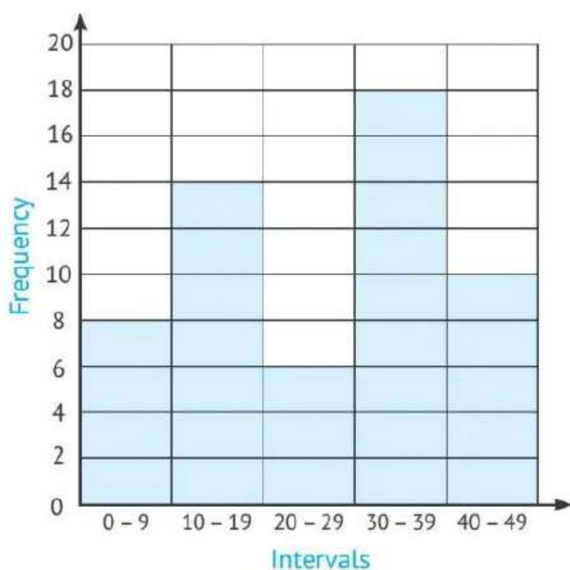
x	2	4	7	9
Y	20	40	70	90



The equation: ....y = 10x..........

15 Using the following histogram, complete the following interval table:

Intervals	Frequency
0 – 9	8
10 – 19	14
20 – 29	6
30 – 39	18
40 – 49	10



16 The box plot for each of the following groups of values:

3 , 8 , 7 , 2 , 10 , 12 , 9 , 2 , 10 , 9

The order: 2 , 2 , 3 , 7 , 8 , 9 , 9 , 10 , 10 , 12 .

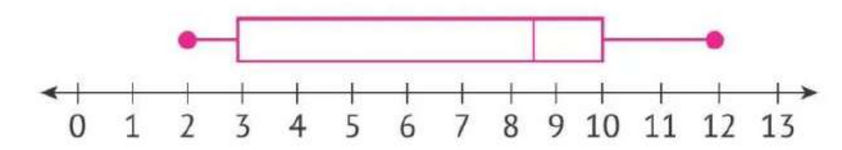
a) Maximum value : 12 .

b) Lower quartile: 3 .

c) Median: 8.5 .

d) Upper quartile: 10 .

e) Minimum value: 2 .

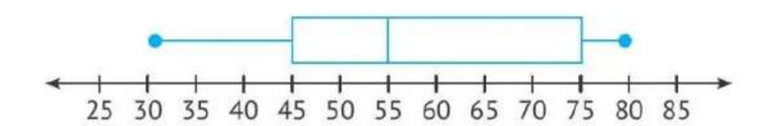


17 Adam saves 40 pounds every month. If the amount he saves in (x) months is (y) pounds, then:

a) The equation that represents this situation is $y = 40x$.

b) Adam saves 480 pounds in a year.

18 Use the following box plot to complete the following:



a Median = ...55........ .

b Maximum value = ...80........ .

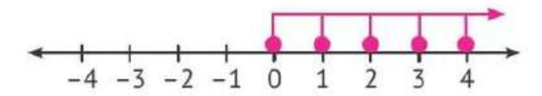
c Lower quartile = ...45........ .

d Upper quartile = ...75........ .

19 Name 3 solutions in the set of integers for the inequality.

Then graph it on a number line.

........0 , 1 , 2........



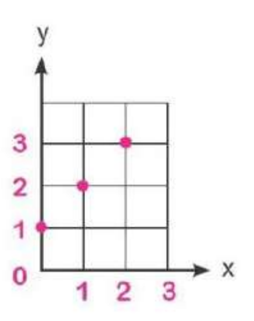
20 Use the order of mathematical operations to simplify: $40 + 5\,(3^2 - 5) - 10$

........40 + 5 X (9 – 5) – 10 = 40 + 5 X 4 – 10........

........= 40 + 20 – 10 = 60 – 10 = 50........

21 Complete the table, then represent it graphically, the equation: $y = x + 1$

x	0	1	2
y	...1...	...2...	...3...
(x, y)	(0, ...1...)	(1 , 2)	(2 , 3)



22 If $y = 2x + 1$, find the value of y for $x = 5$.

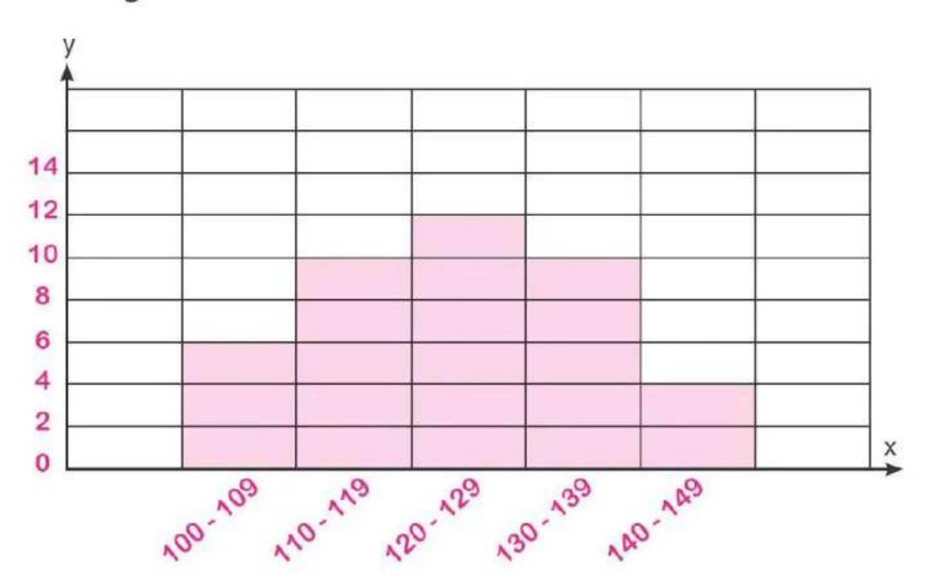
........y = 2 X 5 + 1........

........= 10 + 1 = 11........

23 The following table represents the lengths of 40 students in a school.

Sets	100–109	110–119	120–129	130–139	140–149
Frequency	6	8	12	10	4

Draw the histogram for this distribution:



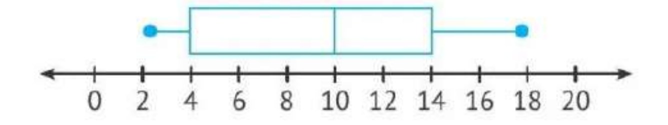
24 **Complete the following:**

a) Write the verbal expression that represents 5y +4

........The sum of 5 times y and 4........ .

b) Write the algebraic expression that represents a "number is decreased by 2" .... $x - 2$ ....

25 In the following box plot



a) The median = ... 10 ....

b) The range = ... 18 – 2 = 16 ....

26 Solve the equation: $x + 2 = 7$

.... $x = 7 - 2 = 5$ ....

27 Complete the following table according to the equation $y = 2x + 1$

x	0	2	4	5
y	1	5	9	11

28 Use the following set of data: 8 , 9 , 6 , 9 , 2 , 9 , 8 to find:

ⓐ The range = 9 – 2 = 7 .

ⓑ The mode = 9 .

29 Evalute the expression $7 + 6(x^2 - 3)$ for $x = 2$

$7 + 6 \times (2^2 - 3) = 7 + 6 \times (4 - 3)$

$= 7 + 6 \times 1 = 7 + 6 = 13$

30 Check the following expressions to see if each pair is equivalent or not.

(Use two values for x from your own)

ⓐ $x + 5$ and $3(x + 2) - 2x - 1$

ⓑ $3 + 2x$ and $3 + 2(x + 3)$

ⓐ	$x + 5$	$3(x + 2) - 2x - 1$	Equal or Not
If x = 1	1 + 5 = 6	3 X (1 + 2) – 2 X 1 – 1 = 6	Equal
If x = 2	2 + 5 = 7	3 X (2 + 2) – 2 X 2 – 1 = 7	Equal

The two expressions are equivlent .

ⓑ	$3 + 2x$	$3 + 2(x + 2)$	Equal or Not
If x = 1	3 + 2 X 1 = 5	3 + 2(1 + 3) = 11	Not equal
If x = 2	3 + 2 X 2 = 7	3 + 2(2 + 3) = 13	Not equal

The two expressions are not equivlent .

Exercises Book Guide Answers



Exercises on Unit 1

Lesson 1

1. a) 9 , 0 , divisible
   b) 6 , 1 , not divisible
   c) 8 , 4 , not divisible
   d) 13 , 0 , divisible
   e) 8 , 3 , not divisible
   f) 9 , 0 , divisible
   g) 4 , 0 , divisible
   h) 4 , 3 , not divisible
   i) 30 , 0 , divisible
   j) 30 , 4 , not divisible
   k) 49 , 0 , divisible,
   l) 150 , 1 , not divisible
   m) 25 , 2 , not divisible
   n) 104 , 0 , divisible
2. 30 – 54 – 26 – 258 – 216 – 250 – 368 – 654 – 2,544
3. 45 – 36 – 456 – 558 – 777 – 891 – 4,662
4. 32 – 612 – 440 – 2,100 – 3,636 – 32,100 – 40,056 – 30,008
5. 45 – 250 – 830 – 940 – 630 – 2,005 – 12,745 – 1,200
6. a) 532 – 650 – 762 – 900
   b) 711 – 345 – 762 – 900
   c) 532 – 900
   d) 335 – 650 – 345 – 900
   e) 762 – 900
   f) 650 – 900
7. a) ✗ , ✓ , ✗ , ✓ , ✗ , ✗
   b) ✓ , ✗ , ✓ , ✗ , ✗ , ✗
   c) ✓ , ✓ , ✗ , ✓ , ✓ , ✓
   d) ✓ , ✗ , ✗ , ✓ , ✗ , ✓
   e) ✓ , ✓ , ✓ , ✓ , ✓ , ✓
   f) ✓ , ✓ , ✗ , ✗ , ✓ , ✗
   g) ✓ , ✓ , ✗ , ✓ , ✓ , ✓
   h) ✗ , ✓ , ✗ , ✓ , ✗ , ✗
   i) ✓ , ✗ , ✓ , ✓ , ✗ , ✓
   j) ✓ , ✗ , ✓ , ✗ , ✗ , ✗
8. a) 0 b) not divisible
   c) 2 d) 0 , 2 , 4 ,6 or 8
   e) 3
   f) not a multiple
   g) 4 h) 5 i) 12 , 3
   j) 24 , 4 k) 28 , 7 , 7 , 28
9. a) 2 b) 213
   c) 2 , 5 and 10 d) 12 e) 10
   f) 12 g) multiple h) 1

Assessment on Lesson 1

1. a) 5 b) 3 c) 2
   d) divisible
2. a) 18 b) 2 c) even
   d) 10
3. a) 816 – 720 b) 816 – 720 – 1,239
   c) 816 – 720 d) 720 – 4,955
   e) 816 – 720 f) 720

Lesson 2

1. a) GCF = 2 , LCM = 24
   b) GCF = 6 , LCM = 72
   c) GCF = 1 , LCM = 36
2. a) prime factors 6 = 2 x 3 , 4 = 2 x 2
   GCF = 2 , LCM = 12 , (NO)
   b) prime factors 15 = 3 x 5 , 6 = 2 x 3
   GCF = 3 , LCM = 30 , (NO)
   c) prime factors 8 = 2 x 2 x2 , 9 = 3 x 3
   GCF = 1 , LCM = 72 , (Yes)
   d) prime factors 12 = 2 x 2 x 3 , 14 = 2 x 7
   GCF = 2 , LCM = 84 , (NO)
   e) prime factors 18 = 2 x 3 x 3 , 9 = 3 x 3
   GCF = 9 , LCM = 18 , (NO)
   f) prime factors 6 = 2 x 3 , 25 = 5 x 5
   GCF = 1 , LCM = 150 , (Yes)

3 a ① 30 and 42 ② 3 , 2 ③ 6 ④ 210 ⑤ (No)
b ① 24 and 16 ② 2 , 2 , 2 ③ 8 ④ 48 ⑤ (No)
c ① 20 and 9 ② 1 ③ 1 ④ 180 ⑤ (Yes)

4 a 2 b None c 2
d 3 e prime number
f 11 g 2, 3, 5, 7 h 3,7
i 18 j 1 k their product

5 a 1 b 59 c 30
d has only two factors e prime
f $2 \times 2 \times 3$ g 8 h 1
i 1 j their product
k their product l 1 m 35
n 72 o 1

Assessment on Lesson 2

1 a 11, 13, 17, 19 b $2 \times 3 \times 3$
c 42 d 1 e 0

2 a 1 b their product
c 1 d 9 e 9 and 4

3 • GCF = 4 • LCM = 48

Lesson 3

1 a 7,5,7,2 b 8,2,8,9 c 8,5,3
d 3,3,7 e 2,4,5,5 f 8,7,6,6
g 7,5,1 h 2,4,3

2 a GCF = 9 b $18 \div 9 = 2$ kg of oranges
c $27 \div 9 = 3$ kg of apples

3 a GCF = 4 → 4 groups
b 3 doctors c 7 nurses

4 • GCF = 12 → 12 groups
• $(12 \times 6) + (12 \times 3) = 12 \times (2 + 3)$

5 • GCF = 6 → 6 pags
• $(6 \times 1) + (6 \times 2) = 6 \times (1 + 2)$

Assessment on Lesson 3

1 a $(4 \times 2) + (4 \times 9)$ b $6 \times (3 + 2)$
c 7 d 6 e 0

2 a $4 \times (4 + 3)$ b $3 \times (3 + 7)$

3 • GCF = 7 → 7 groups
• $(7 \times 3) + (7 \times 5) = 7 \times (3 + 5)$

Lesson 4

1 a $1\frac{1}{6}$ b $14\frac{1}{6}$ c $\frac{15}{16}$
d $14\frac{9}{20}$ e $3\frac{7}{24}$ f $\frac{1}{12}$
g $\frac{13}{18}$ h $3\frac{31}{60}$ i $2\frac{11}{15}$
j $\frac{1}{15}$

2 $3\frac{1}{2} + 4\frac{1}{4} = 7\frac{3}{4}$ kg

3 $9\frac{1}{2} + 5\frac{1}{4} + 4 = 18\frac{3}{4}$ pounds

4 $3\frac{3}{4} - 2\frac{1}{5} = 1\frac{11}{20}$ kg

5 $4\frac{1}{2} - 1\frac{1}{3} = 3\frac{1}{6}$ hr

6 a $\frac{1}{6} + \frac{1}{4} + \frac{1}{3} = \frac{3}{4}$ pizza
b $3 - \frac{3}{4} = 2\frac{1}{4}$ pizzas

7 $15 - (4\frac{1}{2} + 6\frac{2}{5}) = 4\frac{1}{10}$ km

8 a $\frac{1}{8} + \frac{3}{8} + \frac{2}{8} + \frac{1}{8} + \frac{2}{8} = \frac{9}{8} = 1\frac{1}{8}$ bags
b $5 - 1\frac{1}{8} = 3\frac{7}{8}$ bags

Assessment on Lesson 4

1 a $1\frac{1}{2}$ b $4\frac{2}{15}$
c $2\frac{1}{8}$ d $1\frac{1}{6}$

2 a $4\frac{1}{6}$ b $\frac{5}{8}$ c $3\frac{7}{12}$

3 a $15\frac{1}{2} - (4\frac{1}{2} + 5\frac{1}{2}) = 5\frac{1}{2}$ pounds
b ① $\frac{1}{2} = \frac{8}{16}$ ② $\frac{7}{16}$

Assessment on Unit 1

First

a 6 b 0 or 6 c even
d 1 e prime f 1
g their product
h $(6 \times 7) + (6 \times 5)$ i $2 \times (8 + 3)$
j $4\frac{1}{4}$

Second

ⓐ 21 , 7 ⓑ 3 , 39 ⓒ 2
ⓓ 2 ⓔ 2 ⓕ 1
ⓖ their product ⓗ $(8 \times 2) + (8 \times 7)$
ⓘ $2\frac{3}{10}$

Third

1. ⓐ $8\frac{5}{24}$ ⓑ $3\frac{13}{20}$
2. • GCF = 5
   • $(5 \times 5) + (5 \times 3) = 5 \times (5 + 3)$
3. GCF = 8 , LCM = 48
4. $25 - 9\frac{1}{2} = 15\frac{1}{2}$ pounds

Exercises on Unit 2

Lessons 1&2

1. ⓐ −12 ⓑ 40 ⓒ −10
   ⓓ −50 ⓔ 5 ⓕ −20
   ⓖ 16 ⓗ 3 ⓘ −3
   ⓙ −150
2. ⓐ −1 ⓑ −6 ⓒ 7
   ⓓ −8 ⓔ −3 ⓕ 3
   ⓖ 4 ⓗ 0
3. Answer by yourself.
4. The previous : 9, −8, −1, −6, 8
   The next : 11, −6, 1, −4, 10
5. ⓐ $<$ ⓑ $<$ ⓒ $>$
   ⓓ $>$ ⓔ $>$ ⓕ $<$
   ⓖ $>$ ⓗ $<$ ⓘ $>$
   ⓙ = ⓚ = ⓛ $<$
6. ⓐ Ascending: −6, −3, 0, 5, 8
   Descending: 8, 5, 0, −3, −6
   ⓑ Ascending: −3, −1, 0, 1, 3
   Descending: 3, 1, 0, −1, −3
7. ⓐ 9 ⓑ −3 ⓒ 12
   ⓓ 0 ⓔ 1 ⓕ −1
8. ⓐ −15 ⓑ 25 ⓒ −4
   ⓓ −1 ⓔ 12 ⓕ −10
   ⓖ 1 ⓗ 1 ⓘ 0
   ⓙ the same distance , opposite
9. ⓐ −4 ⓑ 0 ⓒ −15
   ⓓ 12 ⓔ 0 ⓕ −6
   ⓖ −1 ⓗ 0 ⓘ less than
   ⓙ greater than

Assessment on Lessons 1&2

1. ⓐ −5 ⓑ −1 ⓒ −8
   ⓓ $<$ ⓔ 8
2. ⓐ 6 ⓑ −2, −1, 0, 1 ⓒ −8
   ⓓ 1 ⓔ −1, 0, 1, 2
3. −32, −3, 0, 2, 9
4. Draw by yourself.

Lessons 3&4

1. Fraction form $\frac{a}{b}$: $\frac{5}{10}$, $-\frac{8}{10}$, $\frac{5}{1}$, $-\frac{7}{2}$, $\frac{11}{4}$

   Additive inverse: −2.5 , 0.8 , −5 , $3\frac{1}{2}$, $-2\frac{3}{4}$
2. ⓐ belongs ⓑ does not belong
   ⓒ does not belong ⓓ does not belong
   ⓔ does not belong ⓕ belongs
   ⓖ does not belong ⓗ does not belong
   ⓘ belongs ⓙ belongs
3. ⓐ a subset ⓑ a subset
   ⓒ not a subset ⓓ a subset
   ⓔ not a subset ⓕ a subset
   ⓖ not a subset ⓗ not a subset
4. ⓐ ✓ , ✓ , ✓ , ✓ , Counting
   ⓑ ✗ , ✗ , ✗ , ✓ , Rational
   ⓒ ✗ , ✓ , ✓ , ✓ , Natural
   ⓓ ✗ , ✗ , ✓ , ✓ , Integers
   ⓔ ✗ , ✗ , ✗ , ✓ , Rational ⓕ ✗ , ✗ , ✗ , ✗ , None
   ⓖ ✓ , ✓ , ✓ , ✓ , Counting
   ⓗ ✗ , ✗ , ✓ , ✓ , Integers
   ⓘ ✗ , ✗ , ✗ , ✓ , Rational
   ⓙ ✗ , ✗ , ✗ , ✓ , Rational
5. Draw by yourself.
6. ⓐ $<$ ⓑ $<$ ⓒ $<$
   ⓓ $<$ ⓔ $<$ ⓕ $<$
   ⓖ $<$ ⓗ $>$ ⓘ $>$
   ⓙ = ⓚ $>$ ⓛ $<$

7 a Ascending : $-5.5, -1\frac{3}{5}, 2\frac{2}{3}, 3.7, 7\frac{1}{4}$

Descending : $7\frac{1}{4}, 3.7, 2\frac{2}{3}, -1\frac{3}{5}, -5.5$

b Ascending : $-0.82, -\frac{1}{2}, 0.25, \frac{1}{2}, \frac{2}{3}$

Descending : $\frac{2}{3}, \frac{1}{2}, 0.25, -\frac{1}{2}, -0.82$

6 a rational number b even number

c natural number d $\frac{3}{4}$

e $-\frac{6}{1}$ f $-4\frac{2}{3}$

g 0.5 h $>$

i $-\frac{8}{4}$ j $\frac{3}{2}$

Assessment on Lessons 3&4

1 a $-4\frac{1}{2}$ b negative integer

c rational d 5 e $-2, -3$

2 a -5.9 b $-5, -6$

c integer , rational numbers

d $-\frac{25}{10} = -\frac{5}{2}$

3 $7.7, 7\frac{1}{2}, 7, -3\frac{1}{5}, -3.8$

Lessons 5&6

1 a 5 b 15 c 6

d 45 e $\frac{7}{9}$ f $7\frac{3}{5}$

g $\frac{3}{4}$ h $7\frac{2}{3}$ i 0.03

j 0.7 k 7.04 l 6.5

2 a $<$ b $>$ c $=$

d $=$ e $=$ f $>$

g $>$ h $>$ i $>$

j $<$ k $<$ l $>$

m $=$ n $<$ o $>$ p $<$

3 a Ascending: $-17, -9, |-3|, 8, |12|$

Descending: $|12|, 8, |-3|, -9, -17$

b Ascending: $-\frac{3}{4}, -\frac{5}{8}, |0.25|, |-0.5|, 0.75$

Descending: $0.75, |-0.5|, |0.25|, -\frac{5}{8}, -\frac{3}{4}$

4 a 5 or -5 b 7 c 9

d -5 e -4 f 18

g Moscow, $<$ h A i -7.2

5 a ① Wael , Tamer and Mohamed

② Tariq, Sameh and Fouad

③ Fouad ④ Tariq

b Fouad , Mohamed , Wael , Sameh , Tamer , Tariq

Assessment on Lessons 5&6

1 a 1.5 b 6 c 2.7 d 0

e farther from zero

2 a 5 or -5 b 3.5 c 9

d same e 0.7

3 $0.75, |-\frac{1}{2}|, |0.25|, -\frac{1}{8}, -\frac{1}{4}$

4 a $<$ b $>$ c $<$ d $<$

Assessment on Unit 2

First

a -8 b 0 c 0

d rational number e natural number

f $\frac{2}{3}$ g $-\frac{3}{10}$ h -3.4

i 3.7 j 0

Second

a -7 b 0 c -11.5

d 1 e same , opposite

f $-7, -8$ g integer , rational umbers

h -1.5 i $8, -8$ j 5.6

Third

① a $<$ b $<$ c $=$ d $<$

② $|0.8|, 0.55, |-\frac{1}{2}|, -\frac{1}{4}, -\frac{3}{5}$

Accumulative Assessments on Units 1-2

First

a $-4\frac{2}{3}$ b 35 c -7

d $>$ e -5

Second

a) 0 b) -1.25 c) $2 \times (8 + 6)$
d) 42 e) $1\frac{1}{6}$

Third

1. a) $7\frac{19}{24}$ b) $2\frac{3}{4}$
2. a) 12 , 30 b) 6 c) 60

Exercises on Unit 3

Lessons 1&2

1. a) -3 / a , b b) 5 / x c) -3 / y
   d) $\frac{1}{5}$ / x , y e) $-\frac{2}{8}$ / m f) 8 / a, b, c
   g) 7 / r h) 5 / x, y, z i) 6 / n
   j) $\frac{3}{7}$ / k, m k) 23 / a, b l) $\frac{1}{6}$ / y, z
2. a) Numerical b) Numerical c) Algebraic
   d) Algebraic e) Algebraic f) Numerical
   g) Numerical h) Algebraic i) Numerical
   j) Algebraic
3. a) a – 8 – 5 b) a,b – 7 – 3,4
   c) x – 15,2.5 – 6 d) y – 63 – 5
   e) m,h – 12, 5 – 0.2 ,0.3 f) w – 2,3,0.2 ,6
4. a) 1 – none b) 1 – none
   c) 2 – 7x , 3x d) 2 – none
   e) 4 – 15 , 3 f) 4 – 3b , 5b , 2b
5. a) $12 - d$ b) $x + 3$ c) $\frac{1}{5}w$ d) $x + 10$
6. a) -3 b) a c) 3
   d) 2 e) 5y , 2y f) none
   g) 9 h) 5,3 i) m – 10

Assessment on Lessons 1&2

1. a) x b) 3 c) 2
   d) 6x , 2x e) 3.2
2. a) none b) 5 , 3 c) $60 - x$
   d) 3 e) $\frac{2}{3}$, 4
3. a) 4 b) 5x , 6x c) 5,2,6 d) 3

Lessons 3

1. a) $36 + z$ b) $x - 5$ c) $a + 9$
   d) 3b e) 7.5p f) $y - 14$
   g) $h \div 6$ h) $9 \div r$ i) $a + 3.5$
   j) $\frac{1}{2}q + 4$ k) $2w - 7$ l) $2v - 3$
   m) $2(g + 6)$ n) $3(s - 2)$ o) $3a + 5$
   p) $x + 7$ q) $m + 12$ r) $x \div 3$
2. a) 9 more than a b) 6 less than b
   c) f less than 7.5
   d) 12 multiplied by y
   e) 8 divided by s f) k divided by r
   g) add 6 to 3 times x
   h) 2 times x less than 7
   i) half the sum of m and 3
   j) 5 times the difference between 3 and c
3. a) → 3 b) → 1 c) → 4
   d) → 2
4. a) $x - 5$ b) $x + 10$ c) $2x - 3$
   d) $3y - 2$ e) $3(m + 12)$ f) $\frac{1}{2}(a - 7)$
   g) $x + 5$ h) x,+

Assessment on Lesson 3

1. a) the sum of 3 and the fifth of a
   b) multiply m by 6 c) 3b
   d) $y - 3$ e) $p \div 4$
2. a) $(m + 18) \div 3$ b) $b + 1$
   c) 4s d) $35 - w$ e) $x - 120$
3. 15t

Lesson 4

1. a) 4 b) 3 c) 3
   d) 8 e) 2^4 f) 6^3
   g) 7×7 h) $6 \times 6 \times 6 \times 6$ i) 10×10
   j) $1 \times 1 \times 1 \times 1 \times 1$ k) $5 \times 5 \times 5$ l) 2×2
2. a) 25 b) 27 c) 32
   d) 1 e) 1 f) 1000
   g) 0 h) 0 i) 1
   j) 1 k) 1 l) 1
3. a) 34 b) 14 c) 12
   d) 25 e) 10 f) 19
   f) 9 g) 12 h) 22

4 a 18 b 3 c 24
d 5 e 10

5 a 22 b 7 c 20
d 9 e 3 f 3
g 2 h 3 i 215
j 2 k 9 l 74

6 a 32 b 5 c 3 d 76

7 a base , power b 4^2
c 6^3 d 7^2 e 4^5
f 6 , 4 g 4 h 4

8 a 4×4 b 1 c 1
d 2^5 e 5^3 f 0
g 1 h $3 \times 3 \times 3 \times 3$ i =
j > k 19 l 800 m 3^3

Assessment on Lesson 4

1 a 3×3 b 1 c =
d 425 e 2

2 a 0 b 1 c 3
d 5 e 8

3 a 30 b 9 c 9 d 16

Lessons 5-7

1 a 8x b 12y c 7 z
d 50m + 15 e 6n + 3 f 300 – 9p
g 3q ÷ 6

2 a 33 b 1 c 3.9
d 5 e 3 f 3

3 a 34 b 21 c 11
d 21 e 7 f 4
g 21 h 0

4 a 11 b 22 c 2 d 12

5 a 10 + 5h b 35 pounds

6 a 10p – 325 b 175 pounds

7 a Not equivalent b Equivalent

Assessment on Lessons 5-7

1 a 120m b 5d + 20 c 15 d 3
e putting the exponent in the simplest form, subtraction , multiplication, addition.

2 a 4 s b 45 c 81
d not equal e 12

3 a 5k + 6 b 26 hours

Assessment on Unit 3

First

a – 3 b 3 c 2
d 2y – 3 e 25 – h f 5^3
g = h 15 b i 2
j first choice

Second

a s – 10 b 7 c 3n , 2n
d 2 (w – 5) e subtract 5 from 3 times x
f 6 n g 80 h 3^6
i 0 j 1

Third

1 a 9n + 20 b ① 2 ② 9 ③ 20

2 not equivalent

Accumulative Assessments on Units 1-3

First

a $\frac{3}{4}$ b x – 9 c 3.7
d 2^3 e 2^4

Second

a 2 b 1 c 2
d 8x e add 4 to 3 times b

Third

1 a 34 b 2

2 $3\frac{3}{4} - 2\frac{1}{5} = 1\frac{11}{20}$ kg

Exercises on Unit 4

Lesson 1

1 a x + 2 = 12 , x = 10
b x + 1 = 7 , x = 6
c 3 x = 12 , x = 4
d 2 x = 12 , x = 6
e 5 x = 10 , x = 2
f x + 6 = 9 , x = 3

Guide Answers

g) $x + 9 = 12$, $x = 3$
h) $8x = 8$, $x = 1$

2) a) 3 b) 5 c) 2
d) 14 e) 4 f) 7
g) 12 h) 20

3) a) 5 b) 11 c) 2
d) 9 e) 4 f) 3
g) 5 h) 3

Assessment on Lesson 1

1) a) 7 b) 2 c) 7
d) 3 e) 18

2) a) $3x = 15$, $x = 5$
b) $x + 1 = 5$, $x = 4$

3) a) 5 b) 11
c) 7 d) 175

Lessons 2&3

1) a) 110 cm – 112 cm – 116 cm
b) 100 cm – 120 cm – 130 cm

2) a) 45,000 kg – 46,000 kg – 47,000 kg
b) 23,000 kg – 24,000 kg – 24,500 kg

3) a) $x > -1$ b) $x < 2$ c) $x > -9$
d) $x < 2$ e) $x \geqslant 6$ f) $x \leqslant -8$
g) $x < 0$ h) $x > 0$ i) $x \geqslant 0$
j) $x > 0$ k) $x \geqslant 0$ l) $x \leqslant 0$

4) a) greater than 9 b) greater than –5
c) less than 2 d) less than –7
e) less than or equal to –3
f) less than or equal to 4
g) greater than or equal to 3
h) greater than or equal to 0

5) a , c , d , f , g , h

6) a) 0 , 1 , 2 or any integer less than 3
b) 1 , 2 , 3 or any integer greater than or equal 1
c) 2 , 1 , 0 or any integer less than 3
d) 3 , 2 , 1 or any integer less than 4
e) 4 , 3 , 2 or any integer less than or equal 4
f) 8 , 7 , 6 or any integer less than 9

7) a) -5 -4 -3 -2 -1 0 1 2 3 4 5
b) -5 -4 -3 -2 -1 0 1 2 3 4 5
c) -5 -4 -3 -2 -1 0 1 2 3 4 5
d) -5 -4 -3 -2 -1 0 1 2 3 4 5
e) -5 -4 -3 -2 -1 0 1 2 3 4 5
f) -5 -4 -3 -2 -1 0 1 2 3 4 5
g) -5 -4 -3 -2 -1 0 1 2 3 4 5
h) -5 -4 -3 -2 -1 0 1 2 3 4 5

8) a) $x > -1$ b) $x < 5$ c) $x \leqslant -7$
d) $x > 3$ e) $x < 0$ f) $x \leqslant 0$
g) 3 does not belong to the solution set on and of then
h) each including all values to the left of 4
i) –9.5 j) 6 k) $x \leqslant 7$

9) a) ① both of them include numbers to the left of –8 on the number line.
② –8 does not belong to the solution set of the inequality " $x < -8$" and –8 belongs to the solution set of the inequality " $x \leq -8$"b.
b) ① –8 belongs to the solution set of the inequality of any of them.
② $x \geqslant -8$ has all numbers to the right of –8 and $x \leqslant -8$ has all numbers to the left of –8.
c) ① None.
② –8 is the solution of " $x = -8$" and –8 does not belong to the solution set of the inequality " $x < -8$".

10) a) $x < 3$ b) $x > -2$ c) $x < -1$
d) $x > 2$ e) $x > -6$ f) $x < 5$

Assessment on Lessons 2&3

1) a) $x > -5$ b) less than c) $x > 0$
d) –3 e) –2

2) a) -4 -3 -2 -1
b) -3 -2 -1 0 1 2

3) a) $x \leqslant 5$ or $x < 6$ b) $x \geqslant 0$ or $x < -1$

Assessment on Unit 4

First

a 4 b 4 c 8
d 3 e $x > 4$ f $x \leqslant -2$
g $x < 0$ h -7
i $x < 4$ j the second graph

Second

a 2 b 5 c 4
d 6 e 12 f $3x = 15$
g $x < -6$ h $x \geqslant 3$ i $x > 0$
j 9 belongs to both

Third

1 a 9 b 6
2 a $x > 1$ or $x \geqslant -2$ b $x \leqslant -3$ or $x < -2$

Accumulative Assessments on Units 1–4

First

a their product b -8 c 2
d $x + 5$ e 8

Second

a 1
b $8 \times (9 + 2) = (8 \times 9) + (8 \times 2)$
c 3 d 1 e $x < -6$

Third

1 $(6 \times 2) + (6 \times 3) = 6 \times (2 + 3)$
2 a 12 b 8



Theme 2

Exercises on Unit 5

Lessons 1&2

1 a Dependent , Independent
b Independent , Dependent
c Dependent , Independent
d Dependent , Independent
e Independent , Dependent
f Independent , Dependent
g Independent , Dependent
h Independent , Dependent
i Independent , Dependent
2 a Independent : r,s,z,x Dependent: e,b,m,y
b Independent : a,t,p,m Dependent: b,f,z,w
3 a $y = 9x$ b x
c y d 54
4 a $y = x + 15$ b x
c y d 135
5 a $y = x - 50$ b x
c y d 370
6 a $y = x \div 3$ b x
c y d 140 , 120 , 90 , 70 , 60
7 a x b a
c ① the number of books ② the price of books
d ① the amount of flour
② the number of baked
e what Ahmed saves each month , what Ahmed saves in a full year.

Assessment on Lessons 1&2

1 a w b a
c distance traveled
d the number of correct answers.
2 a $y = 150x$ b x , y
c 1800 pounds
3 a $y = 90x$ b x c y
d 3,150 pounds

Lesson 3

1
a add 4
b subtract 7
c $y = 5x$
d $y = x \div 7$
e multiply by 2 , then add 3
f divide by 2 , then add 4
g $y = 2(x + 7)$
h $y = (x + 6) \div 3$
i $y = 5x - 2$
j $y = x \div 4 - 3$
k subtract 2 , then multiply by 4
l subtract 9, then divide by 2

2
a • $x = 5$ R: subtract 5
• $y = 7$ eq: $y = x - 5$
b • $x = 4$ R: multiply by 3
• $y = 18$ eq: $y = 3x$
c • $x = 6$ R: multiply by 4
• $y = 20$ eq: $y = 4x$
d • $x = 5$ R: multiply 5 then add 3
• $y = 23$ eq: $y = 5x + 3$
e • $x = 9$ R: subtract 2 then multiply 3
• $y = 12$ eq: $y = (x - 2) \times 3$
f • $x = 18$ R: Divide by 2 then subtract 3
• $y = 4$ eq: $y = x \div 2 - 3$
g • $x = 25$ R: subtract 1 then divide by 3
• $y = 4$ eq: $y = (x - 1) \div 3$

3
a $y = x + 3.1$, $y = 6$
b $y = 2x$, 16
c $y = \frac{1}{3}x$, 5
d $y = 8 - x$, 4.5
e add 5 then multiply by 3 , 21
f subtract from 9 then multiply by 2 , 12

4
a $y = 9 - x$
b $y = 2x + 5$
c $y = 3(x + 6)$
d divide by 3
e subtract 3 then divide by 2
f multiply by 5 then subtract 2
g 22
h 0
i $y = (x + 1) \times 2$

Assessment on Lesson 3

1
a $y = x + 4$
b multiply by 5
c 18
d $y = \frac{1}{2}x + 5$

2
a $y = (x + 4) \div 3$, x , y , 3
b $y = x \div 2 - 1$, x , y , 3
c subtract 5 then multiply by 2 , x , y , 4
d multiply by 3 then add 4 , x , y , 4

3 x ➜ 6 , 7 , 1 , 4 y ➜ 7 , 13 , 21 , 9 , 19

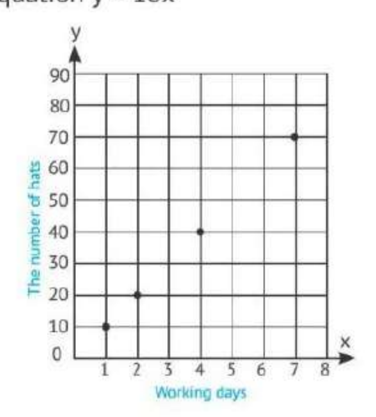
Lesson 4

1



x	1	2	4	7
y	10	20	40	70
(x,y)	(1, 10)	(2, 20)	(4, 40)	(7, 70)

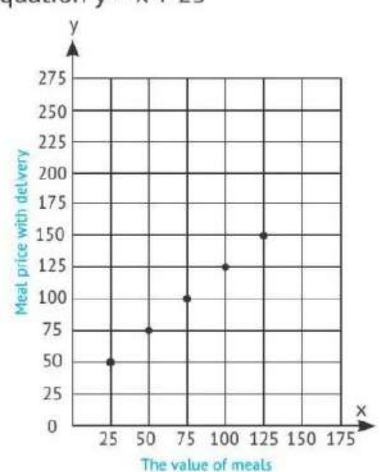
The equation $y = 10x$



2

x	25	50	75	100	125
y	50	75	100	125	150

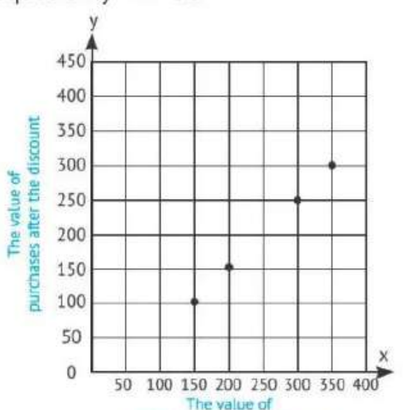
The equation $y = x + 25$



3

x	150	200	300	350
y	100	150	250	300
(x , y)	(150 , 100)	(200 , 150)	(300 , 250)	(350 , 300)

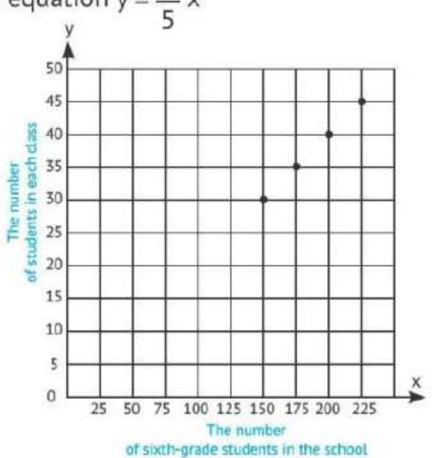
The equation y = x - 50



4

x	150	175	200	225
y	30	35	40	45

The equation $y = \frac{1}{5}x$

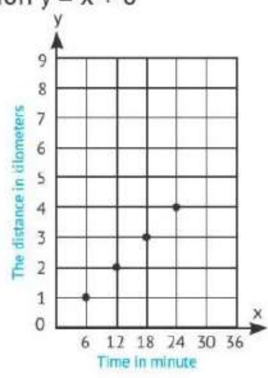


Assessment on Lesson 4

1

x	6	12	18	24
y	1	2	3	4
(x , y)	(6 , 1)	(12 , 2)	(18 , 3)	(24 , 4)

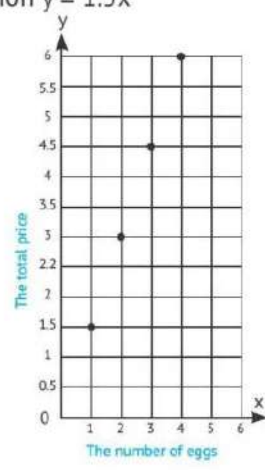
The equation y = x ÷ 6



2

x	1	2	3	4
y	1.5	3	4.5	6
(x , y)	(1 , 1.5)	(2 , 3)	(3 , 4.5)	(4 , 6)

The equation y = 1.5x



Assessment on Unit 5

First

a b   b r

c exam result

d the number of days you go to the club

e y = 6 – x   f y = 2 (x + 5)

g subtract 8 then divide by 3

h 8   i 18

j 32

Second

a a

b ① size of garage
② number of cars

c ① y = x + 2.4 , ② 6.4

d ① y = x ÷ 4 , ② 4

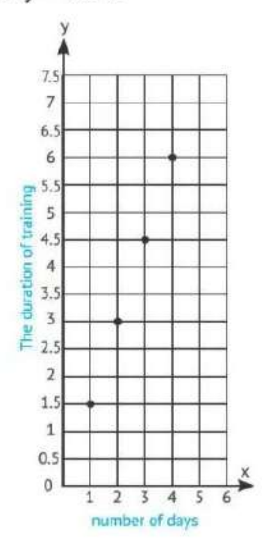
e ① add 15 then divide by 4 , ② 5

Guide Answers

Third

x	1	2	3	4
y	1.5	3	4.5	6
(x , y)	(1 , 1.5)	(2 , 3)	(3 , 4.5)	(4 , 6)

- The equation $y = 1.5\,x$



Accumulative Assessments on Units 1–5

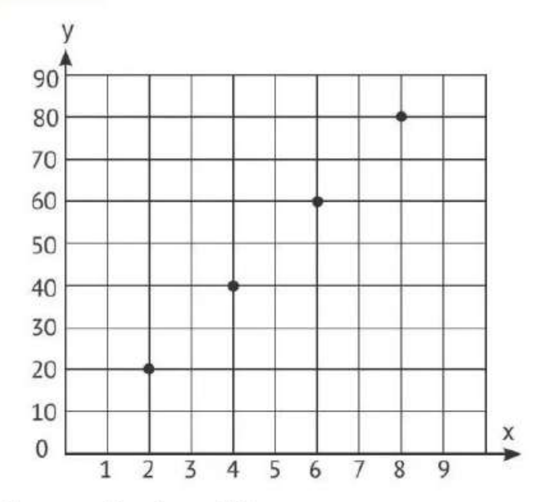
First

a 15 b −1 c (m + 18) ÷ 3
d 3 × 3 × 3 × 3 e 3

Second

a 2 , 3 , 5 , 7 b 9 , 3 , 6 c −2 , −1 , 0 , 1
d same e 12

Third



- The equation is $y = 10\,x$

Exercises on Unit 6

Lesson 1

1. a None b Statistical
   c None d None
   e None f None
   g Statistical h None
   i Statistical j Statistical
2. a Numerical b Categorical
   c Categorical d Numerical
   e Numerical f Numerical
   g Categorical h Numerical
   i Numerical j Categorical
3. a Statistical , Non-statistical
   b Numerical , Categorical
   c Numerical d Categorical
   e Non-statistical , Statistical
   f Non-statistical , Statistical
   g Numerical h Numerical
   i Categorical j Categorical/numerical
4. a result in a lot of different answer
   b favorite color c favorite TV show
   d ages e salaries
   f weights g heights
   h names i types of pets

Assessment on Lesson 1

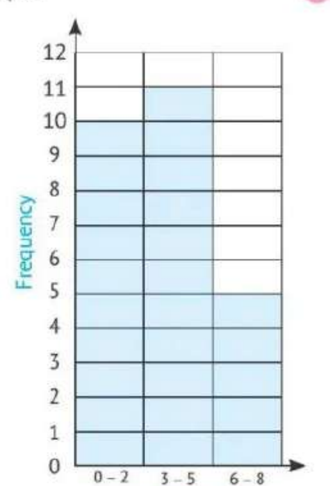
1. a numbers b words
   c non-statistical d statistical  e categorical
2. a Non-statistical b Categorical
   c Non-statistical d Categorical
   e Non-statistical f Numerical
   g Numerical h Non-statistical

Lessons 2&3

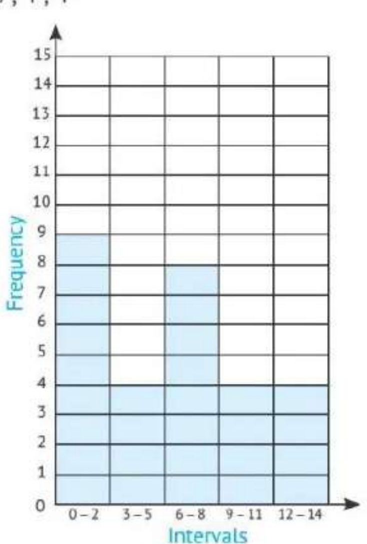
1. a bar graph b histogram
   c bar graph d dot plots
   e histogram f histogram

g bar graph h dot plots
i dot plots j histogram
k histogram

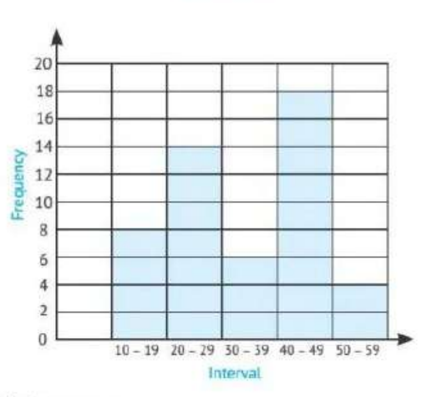
2 8,14,6,18,10 3 10 ,11,5



4 9 , 4 , 8 , 4 , 4



5



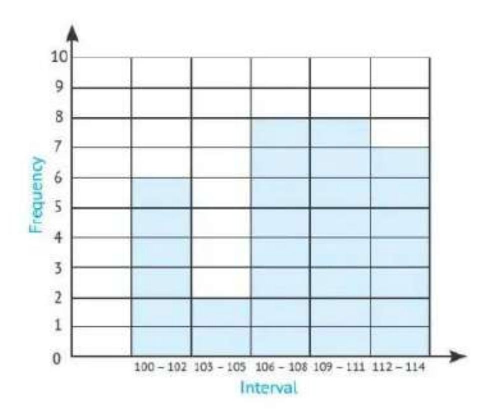
6 a histogram
b dot plots
c bar graph

d all of the previous
e each information is represent by a point
f each bar represent a number or one categorical.
g the bars must touch
h bars are used to represent data
i both of bar graph and histogram
j all of the previous

Assessment on Lessons 2&3

1 a histogram
b bar graph
c all of the previous
d can display numerical and categorical data

2 6 , 2 , 8 , 8 , 7

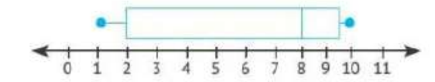


Lesson 4

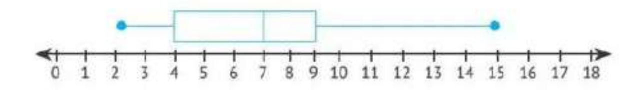
1 a the central tendency b 6
c 6 d 3 e 6
f 2,7

2 a ① 2 ② 4 ③ 10 ④ 15 ⑤ 18
b ① 1 ② 3 ③ 12 ④ 14 ⑤ 16
c ① 4 ② 5 ③ 7 ④ 13 ⑤ 15

3 a The order: 1 , 3 , 8 , 9 , 10
① 1 ② 2 ③ 8 ④ 9.5 ⑤ 10



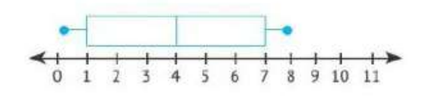
b The order: 2 , 4 , 5 , 7 , 8 , 9 , 15
① 2 ② 4 ③ 7 ④ 9 ⑤ 15



Guide Answers

ⓒ The order: 0 , 1 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 8

① 0 ② 1 ③ 4 ④ 7 ⑤ 8



Assessment on Lesson 4

1. ⓐ 8 ⓑ 4 ⓒ 1
   ⓓ 8 ⓔ 3 , 8
2. ⓐ 2 ⓑ 4 ⓒ 7
   ⓓ 9 ⓔ 10
3. ⓐ 2 ⓑ 6 ⓒ 10
   ⓓ 13 ⓔ 16
4. ⓐ 2 ⓑ 2 ⓒ 4
   ⓓ 6 ⓔ 9

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Lesson 5

1. ⓐ Dot plot, box plot
   ⓑ Dot plot, box plot
   ⓒ Dot plot, box plot
   ⓓ Dot plot, box plot
   ⓔ Dot plot, box plots
   ⓕ dot plots, histogram
   ⓖ Dot plot ⓗ dot plots
   ⓘ dot plots
   ⓙ Dot plot, histogram
   ⓚ Dot plot, histogram ⓛ dot plots
   ⓜ dot plots
   ⓝ Dot plot, histogram
2. ⓐ ① 5 , histogram ② 140 , box plot
   ③ 0 , box plot ④ 300 , box plot
   ⑤ 4, histogram
   ⓑ ① , ② answer by yourself
3. ⓐ ① 4 , dot plots ② 152 , both
   ③ 140 , both ④ 159 , both
   ⑤ 7 , dot plots
   ⓑ answer by yourself
4. histogram
5. ⓐ ② ⓑ ③ ⓒ ①

Assessment on Lesson 5

1. ⓐ ② ⓑ ③ ⓒ ①
2. ⓐ 95, dot plots ⓑ 0 , dot plots
   ⓒ 30 , both ⓓ 8 , both
   ⓔ 6 , both

Assessment on Unit 6

First

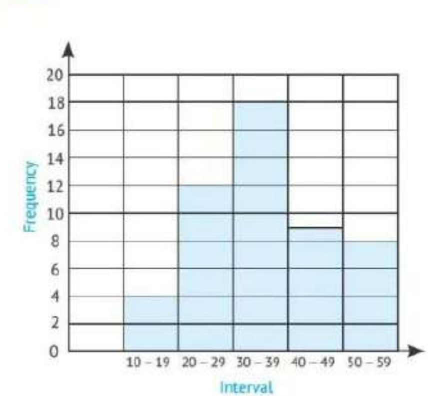
ⓐ It results in a lot of different answers
ⓑ favorite colors ⓒ ages ⓓ weight
ⓔ names ⓕ histogram ⓖ dot plot
ⓗ both bar graph and histogram
ⓘ 8 ⓙ 8

Second

ⓐ statistical , non-statistical
ⓑ numerical , categorical
ⓒ numerical ⓓ numerical
ⓔ histogram ⓕ bar graph
ⓖ 7 ⓗ 1
ⓘ dot plot ⓙ histogram

Third

1.



2. • order: 2 , 2 , 3 , 7 , 8 , 9 , 9 , 10 , 10 , 12
   • Min: 2 • Max: 12 • Median: 8.5
   • Upper: 10 • Lower: 3 , (Draw by your self)
3. ⓐ ① 3, dot plots ② 52 , both
   ③ 40 , both ④ 59 , both
   ⑤ 9 , dot plots
   ⓑ • Dot plots
   ① How many students weight 50 kg?
   ② How many students weight less than 40 kg?

- Box plots
  ① What is the upper quartile?
  ② What is the lower quartile?
  (there are mony answers)

Accumulative Assessments on Units 1–6

First

a 1 b 0 c rational
d 3 e $x \leqslant -7$

Second

a 6 ,4 b 65 b c 7
d $x > 0$ or $x \geq 1$ e $x > 1$ or $x \geqslant 2$

Third

1 a 2 b 10 c 6
d 8 e 3
2 a 34 b 29

Exercises on Unit 7

Lessons 1&2

1 a 5 b 13 c 6 d 7
e 15 f 8 g 15 h 6
i 16 j 24
2 a 5 b 5.5 c 4 d 3
e 3 f 50
3 126 4 92 5 24
6 2 7 3
8 a 23.25 b 4 c 10 d 1
e 8 f 9 g 48
9 a 7 b 4 c 24
d 5 e 100 f 6

Assessment on Lessons 1&2

1 a 8 b 3.5 c 6
d 75 e 17
2 a 5 b 15
3 $6\frac{2}{5} = 6.4$ 4 41,000

Lesson 3

1 a 6 b 5,9 c none
d 9 e 12 f none
g 1 h none i 3,6
j none
2 a 28 b 2 c 200
d 4 e none f none
g 50,51 h 219,220 i none
j none
3 a stays the same b increases
c decreases d stays the same
e increases f decreases
4 a both b median c mean
d mean e both f mean
5 a 8 , 9 , 9and10 , 1
b 14 , 14 , 11 , none
c 9 , 8.5 , 7 , 14
d 27 , 27.5 , 30 , 20and21
6 a the most common value b 2
c 25 d more than e decreases
f affected g not affected h median
i mean

Assessment on Lesson 3

1 a 3 b pen c 6
d mean e mean
2 a two modes b decreases
c both mean and median
3 a 17 b 17
c 16 d 10

Lesson 4

1 a 32 b 34 c 5
d 7 e 58 f 7
g 51
2 a 11,19,8 b 2,9,7 c 10,21,11
d 21,28,7 e 11,22,11 f 31,39,8
3 a 20,11,9 b 10,0,10 c 21,10,11
d 30,20,10 e 23,12,11 f 38,31,7
4 a 18,11,7 b 200,85,115
c 1,200 , 3,600 , 2,400
d 215 , 280 , 65

5 a maximum - minimum
b box plots or dot plots
c histogram d 8 e 12
f 17 g 27 h affected
i largest and smallest values j spread

Assessment on Lesson 4

1 a range b 6 c 21
d largest and smallest value
2 a 12 b 18 c range
d histogram
3 a 11 b 28 c 17
d 21 e 21.5 f 18

Assessment on Unit 7

First

a 63 b 6 c median
d histogram e range f decrease
g the mean h 15
i 3 j 7

Second

a 5 b 3,5 c 14
d 18 e mean , range

Third

1 a 24 b 24 c 24
d 9 e 29
2 a 25 b 25 c 25
d 8 e 30

Accumulative Assessments on Units 1-7

First

a 1 b $4\frac{1}{4}$
c −2 , −3 d $2(x+7)$
e Bar graph

Second

a 11 b −5.9 c x
d $x > -1$ e z , m

Third

1 a 21 b 10 c 14 d 11
2 a 10 b 2 c 6
d 6 e 8

Final Revision Guide Answers

First

1 0 2 2 3 3
4 4 5 5 6 2
7 213 8 6 9 10
10 12 11 5 12 3
13 18 14 2 15 3
16 4 17 1 18 1
19 2x2x3 20 Their product
21 Their product 22 1 23 35
24 11 25 Even
26 2x2x5 27 1 28 18
29 40 30 1
31 (6x7) + (6x5) 32 2x(8 + 3) 33 $4\frac{1}{4}$
34 −4 35 −2 36 −15
37 12 38 0 39 −6
40 −1 41 0
42 Less than 43 Greater than 44 −5
45 Is a subset of 46 −1 47 −8
48 $<$ 49 8
50 Rational numbers 51 Even numbers
52 $-4\frac{2}{3}$ 53 0.5
54 Natural number 55 $-\frac{3}{4}$ 56 $-\frac{6}{1}$
57 $>$ 58 $-\frac{8}{4}$
59 Negative integer 60 Rational 61 5
62 −2, −3 63 −8 64 3.7
65 0 66 2.7
67 Farther 68 X
69 5y , 2y 70 9
71 m − 10 72 60 − x 73 x − 5
74 x + 10 75 2x − 3

76 $\frac{1}{2}(a-7)$ 77 $x+5$ 78 X, +
79 $S \times 4$ 80 15b 81 4x4
82 1 83 1 84 2^5
85 0 86 = 87 >
88 19 89 3^3
90 120m 91 $5d+20$ 92 15
93 2 94 8 95 3
96 $X > -1$ 97 $n > 7$
98 $X < 5$ 99 Second model
100 $X < 2$ 101 $X + 2 = 9$
102 $X \leqslant -7$ 103 −9.5 104 6
105 $X < 0$ 106 W 107 a
108 Distance traveled
109 The number of correct answers
110 $Y = 9 - x$ 111 Divide by 3
112 Subtract 3, then divide by 2 113 22
114 Results in a lot of different answers
115 Favorite colours 116 Ages
117 Weights 118 Type of pets
119 histogram 120 Dot plot
121 bar graph 122 All the previous
123 Each in formation is represented by a point
124 Each bar represents a number or one categorical
125 The columns must touch
126 bars are used to represent data
127 both of bar graph and histogram
128 all the previous 129 histogram
130 All the previous
131 can display numerical and categorical data
132 50 133 5 134 6
135 6 136 3 137 6
138 Two modes 139 Increases
140 Both mean and median
141 range 142 Histogram 143 6
144 3.5 145 5 146 53
147 None 148 Median
149 Decreases 150 9 151 35
152 12 153 Infinite
154 Category 155 8^2
156 Rational 157 Bar graph
158 Subtract 159 4 160 $4(x+4)$

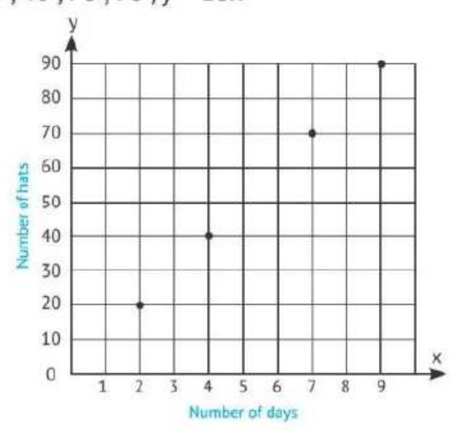
Second

1 15 2 Even 3 3
4 28 , 4 5 5 6 36, 9
7 30 8 30 , 60 , 90 9 2
10 2 11 2 12 2
13 3 14 1
15 Their product 16 2, 2, 7
17 $(5 \times 3) + (5 \times 6)$ 18 9 , 4 , 6
19 The same distance, opposite
20 Not subset 21 −10
22 8 23 Zero 24 1
25 0 26 0 27 −1
28 0 29 −10
30 −2, −1, 0, 1 31 Natural, integer, rational
32 −7 , −8 33 rational
34 integer, rational 35 $\frac{-25}{10}$ 36 −6
37 5 , −5 38 −4
39 Equal 40 3 41 −5
42 2 43 3.2 44 3b
45 $Z + 36$ 46 $X - 5$
47 Twice the sum of a and 7 48 4s
49 81 50 33 51 8
52 $2(w-5)$ 53 4^2 54 6^3
55 7^2 56 4 57 3^6
58 $X + 1 = 8$ 59 $70 - k$
60 $X + 6$ 61 5 62 11
63 2 64 9
65 $X < -6$ 66 $X > -9$
67 $X \geqslant 2$ 68 $X > 0$ 69 m
70 Adding 4 to x 71 Not statistical
72 Dot plot 73 Mean and median
74 Box plot 75 Weight , birth date
76 6 77 3 78 3
79 9 80 Bar graph 81 6.5
82 62
83 Greatest value − smallest value
84 Histogram 85 8 86 10
87 18 88 Mean, range 89 27
90 17

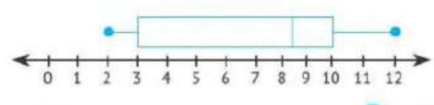
Guide Answers

Third

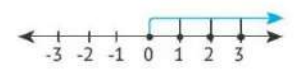
1. Yes, He can because 340 is divisible by 5
2. No, there's no any jutes left because 78 is divisible by 3
3. No, there's no any candles left because 208 is divisible by 4
4. a 12 , 45　b 3　c 3　d 180　e No
5. a 10, 21　b none　c 1　d 210　e Yes
6. 6(8 + 3) = (6 x 8) + (6 x 3)
7. 8(2 + 3) = (8 x 2) + (8 x 3)
8. GCF = 12　LCM = 72
9. Ascending order: – 17, – 9, |– 3|, 8, |12|
   Descending order: |12|, 8, |– 3|, – 9, – 17
10. a 3　b 3　c 21
11. a 15t　b 10 p – 325
12. a y = 150x　b x　c y　d 1,800
13. a y = x – 50　b x　c y　d 370
14. 20 , 40 , 70 , 90 , y = 10x



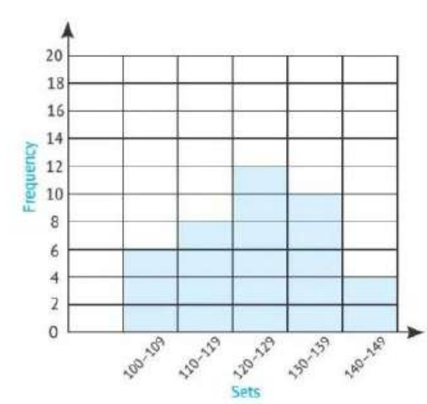
15. 8 , 14 , 6 , 18 , 10
16. The order: 2 , 2 , 3 , 7 , 8 , 9 , 9 , 10 , 10 , 12
    a 12　b 3　c 8.5　d 10　e 2



17. a y = 40x　b 480
18. a 55　b 80　c 45　d 75
19. 0, 1, 2

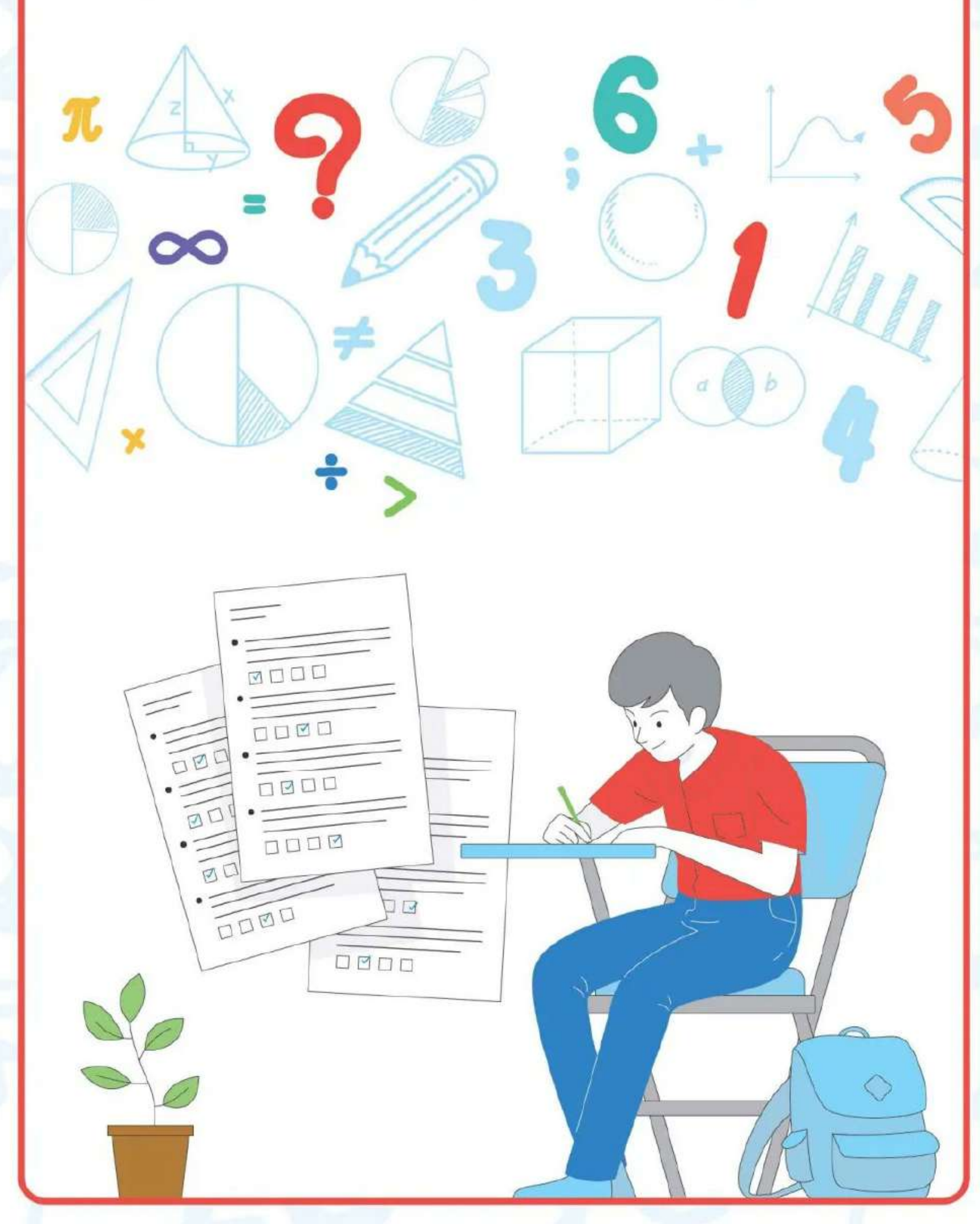


20. 50
21. y: 1 , 2 , 3
    (x, y): (0, 1) , (1 , 2) , (2 , 3)
22. 11
23.



24. a 5 times y added to 4　b x – 2
25. a Median = 10　b range = 18 – 2 = 16
26. X = 5
27. 1, 5, 9, 11
28. a Range = 9 – 2 = 7　b mode = 9
29. 13
30. a equivalent　b not equivalent

Model Exams



Cairo Governorate – El Maadi Educational Zone

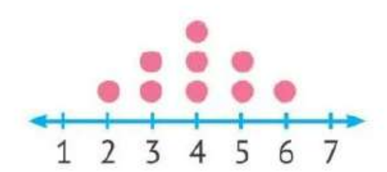


First: Choose the correct answer:

1. $|-8| - |2| =$ .... (82 or 6 or 10 or 16)
2. -10 ☐ -2 (> or = or < or otherwise)
3. The best subset for the fraction $\frac{1}{5}$ is a/an .... number. (counting or integer or natural or rational)
4. In the equation "$y = 2x + 10$" the constant is .... (10 or x or y or 2)
5. The value of: $m^2 + 2$, for $m = 3$ is .... (35 or 9 or 11 or 7)
6. The opposite of the number -3 is .... (0 or 1 or 2 or 3)
7. The smallest counting number is .... (0 or 1 or 2 or −1)

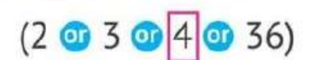
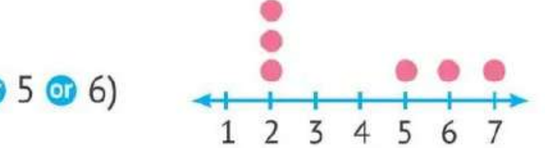
Second: Complete the following:

1. $7(5 + 3) = ($ ....7.... x ....5.... $) + ($ ....7.... x ....3.... $)$
2. $\frac{1}{8} + \frac{1}{4} =$ ....$\frac{1}{8} + \frac{2}{8} = \frac{3}{8}$....
3. If $2x = 12$, then $x + 1 =$ ....7.... .
4. In the equation: "$y = x + 2$", the dependent variable is ....y.... .
5. The verbal form of $3k = 12$ is ....3 times the number "k" is 12.... .
6. In $126 \div 25 = 5$ R1, the divisor is ....25.... .
7. The mode of the opposite figure is ....4.... .



8. The mean of the values: 3, 5, 4, 7, and 6 is ....5.... .

Third: Choose the correct answer:

1. Adding k to the number 3 is .... (**k + 3** or 3k or k − 3 or k ÷ 3)
2. The number .... is a solution of "$x \leq 4$". (5 or **1** or 6 or 12)
3. The median of the values: 9,4,8, 1, and 3 is .... (1 or 3 or **4** or 8)
4. The range of the set of values: 9 , 4 , 1 , 3 and 5 is .... (4 or 6 or 10 or **8**)
5. The outlier of the following values: 1,4 , 52 , 3 , 7 is ..... . (**52** or 1 or 3 or 7)
6. 9 x 9 x 9 x 9 = $9^{\dots}$  (2 or 3 or **4** or 36)
7. The balance point in the opposite figure is ....  (3 or **4** or 5 or 6)

8. The smallest number divisible by 2 and 3 is ....  (5 or **6** or 8 or 9)

Fourth: Answer the following:

1. Evaluate the expression: $(3^2 - 5) + 7 \times 2$



= (9 − 5) + 7 X 2 = 4 + 7 X 2

= 4 + 14 = 18

2. If y = 2x + 1, find the value of y for $x = 5$.



y = 2 X 5 + 1

= 10 + 1 = 11

3. Use the Venn diagram to complete:

a b

2 3 5

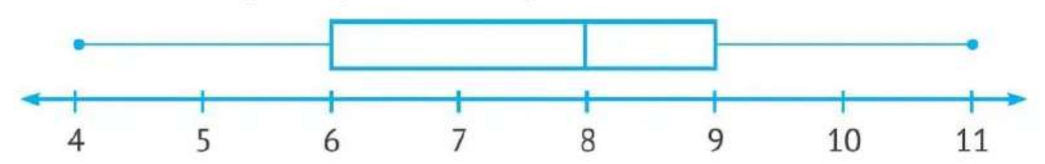
A. The two numbers are:

a = 2 X 3 = 6 , b = 3 X 5 = 15

B. The GCF for the two numbers is ....3.......... .

C. The LCM for the two numbers is ......2 X 3 X 5 = 30...... .

4 Use the following box plot to complete:



A The minimum value is ....4..... .
B The range is ....11 – 4 = 7........ .
C The median is .....8...... .
D The lower quartile is .....6..... .

Cairo Governorate – Al Basatin Educational Zone 2

First: **Choose the correct answer:**

1 | −6 | + 4 .... 15 − | 10 | (> or < or = or ≥)

2 The best subset of the number 0 is a/an .... number.

(counting or natural or integer or rational)

3 The outlier of the following values: 80, 11, 78, and 83 is ....

(80 or 11 or 78 or 83)

4 The value of the expression "6 − n for n = 1" is .... (2 or 3 or 4 or 5)

5 The constant in the expression "8x − 5y + 2" is .... (x,y or 8 or 5 or 2)

6 The sum of 5 and 4 times the number n is ....

(5+ 4 n or 4 + 5 n or 5 x 4 + n or (5 + 4) x n)

7 9^3 = ... (9 + 9 + 9 or 9 x 9 x 9 or 3 x 9 or 3^9)

Second: **Complete the following:**

1 40 + 5 + 3^2 = ...40 + 5 + 9 = 45 + 9 = 54..........

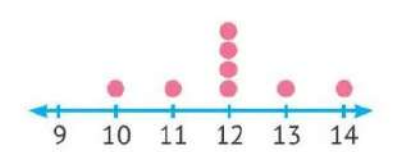
2 ....12...... is the smallest 2-digit number that is divisible by 6.

3 The mode of the following values 4 , 3 , 2 , 7 , 4 , 5 and 4 is ......4..... .

4 The opposite of the number 6.5 is ..-6.5.. .

5 $\frac{3}{8} + \frac{1}{4} =$ ...... $\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$ ....

6 The mean of the opposite data is ...12... .



7 $2(5+4) =$ ...10... $+ 8$

8 The smallest positive integer number is ...1... .

Third: Choose the correct answer:

1 The independent variable in the equation "m = 5n + 3" is ....

(m or **n** or 5 or 3)

2 $-\frac{7}{8}$ ▭ $\frac{1}{8}$ (> or **<** or = or ⩾)

3 ...... is a solution of "$x < 6$". (8 or 7 or 6 or **5**)

4 ...... is lying between – 4 and – 7. (–3 or **–5** or –8 or –9)

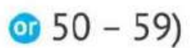
5 All the following expressions are equivalent, except ....

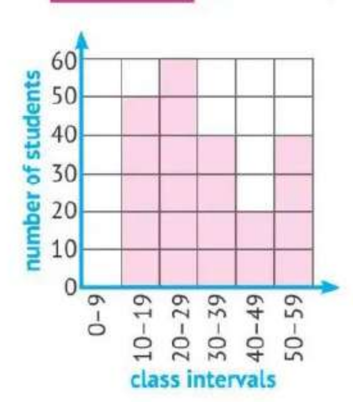
(4x + 8 or 2 (2x + 4) or **4 (x + 4)** or 4 (x + 2))

6 Which of the following is a numerical expression?

(2x + 3y or 4 + 2k or **4 (5 – 2)** or m – 6)

7 In the opposite histogram, the class of intervals having the greatest frequency is ....

(10–19 or  **20 – 29** or 30 – 39 or 40 – 49 or 50 – 59)

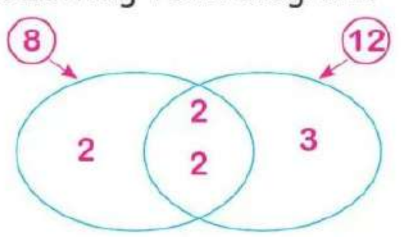


Fourth: Answer the following:

1 Find the GCF and LCM of 8 and 12 using the following Venn diagram.

A The GCF = ... 2 X 2 = 4 ......

B The LCM = ... 2 X 2 X 2 X 3 = 24 ......



2 Complete the following table, then write the equation that expresses the relationship between y and x.

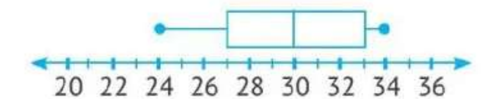
x	1	2	4	...6...
y	3	6	..12..	18

The equation: .... $y = 3x$ ....

3 There are 460 kilograms of oranges. A worker separates the oranges into boxes of 10 kilograms. Will there be any oranges left? why?

.... No, because 460 is divisible by 10 ....

4 From the opposite box plot



A The median = ... 30 ....

B Lower quartile = ... 27 ....

C Upper quartile = ... 33 ....

D The range = ... 34 – 24 = 10 ....

Giza Governorate – El Ayyat Educational Zone 3

First: Choose the correct answer:

1 The mode of the values: 5,3,2,5,8,1,5, and 4 is .... (1 or [5] or 3 or 4)

2 16 + 24 = 8 (2 + ...) (24 or 16 or 2 or [3])

3 The GCF of two relatively prime numbers is .... (0 or [1] or 2 or 3)

4 5^4 = ... (4^5 or 4 x 5 or [5 x 5 x 5 x 5] or 4 x 4 x 4 x 4 x 4)

5 The smallest non–negative integers is ....

(–1 or –2 or [0] or 1)

6 | –8 | > .... ([| –7 |] or | –8 | or | –9 | or | –10 |)

7 The coefficient in the algebraic expression "5 + $3x^2$ + 1" is ....

(5 or 3 X^2 or [3] or 1)

Second: Complete the following:

1. The LCM of 4 and 12 is ...12... .
2. The range = ...greatest value...... – ......smallest value......
3. $9 \times 9 \times 9 \times 9 = 9^{4}$
4. The constant in the expression "5x + 2" is ...2... .
5. $8 - 3 \times 2 \div (4 - 2) =$ ......5......
6. The types of statistical data are ...Categorical... and ...numerical... .
7. $\frac{2}{7} + \frac{1}{7} + \frac{4}{7} =$ ...... $\frac{7}{7} = 1$ ......
8. (3 , ...2......) satisfies the qualitative: $y = \frac{1}{3}x + 1$.

Third: Choose the correct answer:

1. The cube of 6 equals .... (3x6 or 6 + 3 or **6^3** or 3^6)
2. If 3x = 9, then x = ... (**3** or 9 or 27 or 1)
3. In the equation "$x = 3y + 4$", the dependent variable is ....

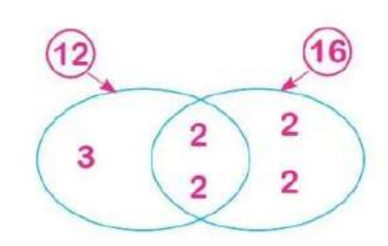
   (**x** or y or 3y or 3y +1)
4. The outlier of the following values 32 , 37 , 36 , 5 , 40, and 38 is ....

   (32 or 40 or **5** or 39)
5. 9 (5 + 6) = ... + 54 (**45** or 95 or 96 or 54)
6. 4,101 is divisible by .... (2 or **3** or 4 or 5)
7. Which of the following is an algebraic expression?

   ($3^2 - 4$ or **5x +3** or $29 - 3^3$ or 2[4 + 5])

Fourth: Answer the following:

1 Find the GCF of 12 and 16 using the opposite Venn diagram.



GCF = 2 X 2 = 4

2 Find 3 possible solutions for the inequality "$x \leq -2$" in the set of integers:

-2 , -3 , -4 .

3 Use the order of mathematical operations to simplify:
$40 + 5 (3^2 - 5) - 10$.

40 + 5 (9 – 5) – 10 = 40 – 5 X 4 – 10

= 40 + 20 – 10 = 60 – 10 = 50

4 Draw a box plot for the following data.

14 , 12 , 10 , 8 , 3 , 6 , 9 , 7 , 5 , 4 , 13

The order: 3 , 4 , 5 , 6 , 7 , 8 , 9 , 10 , 12 , 13 , 14

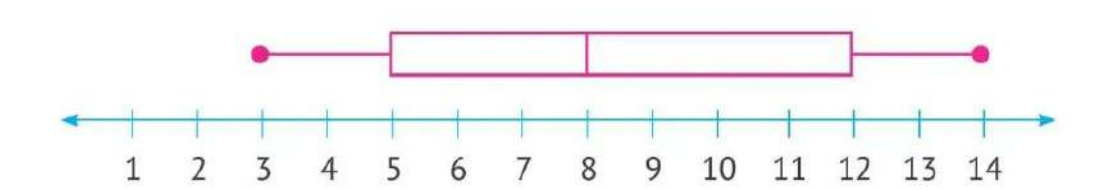
A Min : 3

B Q1 : 5

C Median: 8

D Q3 : 12

E Max : 14



Alexandria Governorate - El Montazah Educational Zone(1)

4

First: Choose the correct answer:

1. The smallest natural number is .... (−1 or **0** or 1 or 3)
2. The mode of values 5 , 3 , 2 , 5 , and 6 is .... (**5** or 2 or 3 or 6)
3. The constant in the expression 4y + 7 is .... (y or **7** or 4 or 4y)
4. The remainder of 527 ÷ 5 = ... (**2** or 3 or 4 or 0)
5. | −12 | = ... (**12** or −12 or 0 or 10)
6. If 5x = 30, then x = ... (5 or 30 or 2 or **6**)
7. In the equation "y = 6x − 2", the dependent variable is .... (**y** or −2 or x or 6)

Second: Complete the following:

1. The mean of the values 4 , 8 , 6 , 15 , and 7 is ....8.... .
2. Three squared = ...3^2....
3. If m − 3 = 7, then m = ...10.... .
4. $3\frac{1}{7} + 2\frac{1}{2} = 3\frac{2}{14} + 2\frac{7}{14} = 5\frac{9}{14}$
5. The additive inverse of number −3 is ....3.... .
6. 5 x (....9.... + ...2....) = (45 + 10)
7. −1.5 in the form of $\frac{a}{b}$ is ....$-\frac{15}{10}$.... .
8. ....10.... is the smallest number that is divisible by each 2 and 5.

Third: Choose the correct answer:

1. "s equals the product of y and 5" in equation is .... (s = 5 + y or s = 5 ÷ y or **s = 5y** or s = 5 − y)
2. The horizontal axis includes numerical periods or intervales in .... (dot plots or bar graphs or **histograms** or all the previous)

3 $-\frac{1}{2}$ ☐ zero (> or **<** or = or ≥)

4 The range of the set of values 7 , 3 , 6 , 9, and 5 is .... (3 or 4 or **6** or 12)

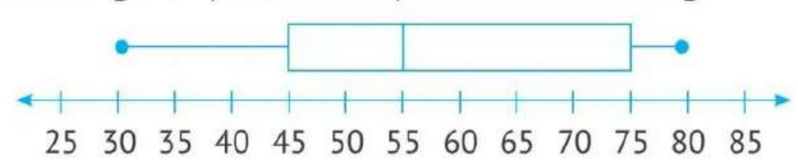
5 A set of counting numbers .... a set of natural numbers.
(belongs to or does not belong to or **is a subset of** or is not a subset of)

6 The outlier value of the following data set (75 , 73 , 71 , 2 , 72) is ....
(70 or 75 or **2** or 71)

7 9 x 9 x 9 x 9 = ... (4^9 or **9^4** or 9 or 9 x 4)

Fourth: Answer the following:

1 Use the following box plot to complete the following:

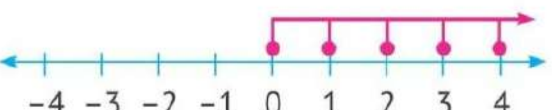


A Median = ...55................... B Maximum = ...80...................

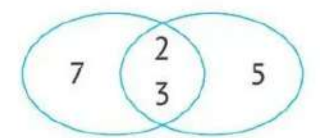
C Lower quartile = ...45........... D Upper quartile = ...75...................

2 Name 3 solutions in the set of integers for each inequality. Then graph it on a number line. m ≥ 0





3 From the opposite Venn diagram:



A The two numbers are ....42......... and ....30........ .

B The GCF of the two numbers is ....6........ .

C The LCM of the two numbers is ....210....... .

4 Use the order of operation and exponent to simplify each of the following expressions:

A $10 + (5^2 - 8)$

$10 + (25 - 8) = 10 + 17 = 27$

B y ÷ 6 + 5 at (y = 24).

$24 \div 6 + 5 = 4 + 5 = 9$

Alexandria Governorate – El Montazah Educational Zone(2)

5

First: Choose the correct answer:

1. $3\frac{1}{5} + 1\frac{3}{5} =$ .... ($4\frac{4}{5}$ or $2\frac{2}{5}$ or $\frac{4}{5}$ or 1)
2. A number that is no less than 7 can be written as ....
   ($n \leqslant 7$ or $n \geqslant 7$ or $n < 7$ or $n > 7$)
3. Seven cubicd added to 5 = ... ($7^2 + 5$ or $7^3 + 5$ or $2^7 + 5$ or 7 X 2 X 5)
4. The opposite table shows the 5–number summary of the weight of your family members. About $\frac{3}{4}$ of them have more than what number? (60 or 75 or 95 or 105)

Min	Q1	Mediam	Q3	Max
60	75	95	105	120

5. .... is lying between –1.4 and –0.9. (–0.7 or –1.3 or –1.6 or –0.90)
6. If 8 m = 0, then 100 m = ... (8 or 100 or 0 or 800)
7. 18 + 9 = 9 x (.................... + ...) (2 , 3 or 9 , 1 or 2 , 1 or 2 , 7)

Second: Complete the following:

1. All even numbers are divisible by ....2.....
2. The age of Mona is now x years old, then her age 3 years ago was ....x – 3
3. If the median of the values K + 1, K + 2, K + 3, K + 4, K + 5, is 13, then K = ...10.....
4. $2\frac{1}{9} + 2\frac{8}{9} =$ ....5.....
5. 8 is increased by l, which is equal to q in the equation, which is ....q = l + 8
6. The median for the set of values 15, 15, 17, 18, 19, 21, 22, 22, 23, is ....19....
7. K + 3 = 8 then k – 2 = ...3.....
8. The LCM of 5 and 8 is ....40.....

Third: Choose the correct answer:

1. Which of the following are relatively numbers?

(2 and 6 or 4 and 9 or 4 and 8 or 1 and 0)

2. The outlier value of the following data set is 23, 25, 27, 24, 94,21,22, 26

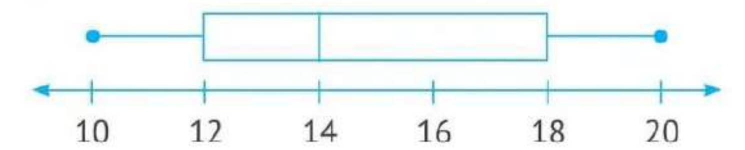
(21 or 27 or 49 or 94)

3. The lower quartile for the set of data 60 , 61 , 63 , 64 , 70 , 72 , 75 , 77 , 79 is .... (61 or 70 or 62 or 76)

4. -8 .... 4 (< or > or = or ⩽)

5. What is the range of this data set? (4,3,5,7) (4 or 3 or 5 or 7)

6. From the following box plot, the difference between Q3 and Q1 is ....



(12 or 14 or 10 or 6)

7. Ali has x pound, his brother give him 9 pounds, then he has ....

($x - 9$ or $x + 9$ or $9x$ or $\frac{x}{9}$)

Fourth: Answer the following:

1. Order the given set of numbers from the greatest to the least as in the following table: 3.25 , −275 , 5 , − 2.3 , $\frac{3}{4}$

Greatest				Least
5	3.25	$\frac{3}{4}$	-2.3	-275

2. Solve the equation "$x + 5 = 7$"

$x = 7 - 5 = 2$

3. Find the GCF of 7 and 12 using the opposite Venn diagram:

7 | 12

7 | 2, 2, 3

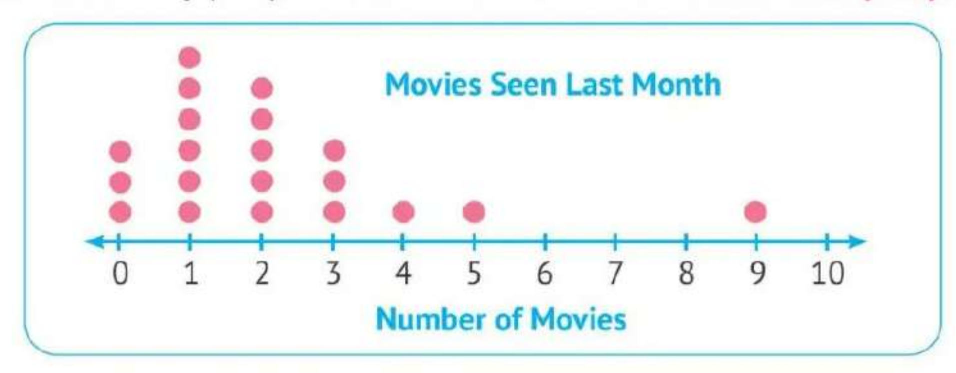
GCF = 1

4 Using the following dot plot, answer the following questions

A How many people saw 3 movies?

3 people

B How many people saw 2 movies or more? 11 people



El Behira Gavernorate – Damanhour Educational Zone

6

First: **Choose the correct answer:**

1 .... is lying between 3.15 and 3.2. (3.7 or 3.1 or 3.17 or 3.22)

2 0 is a/an ..... number. (counting or natural or negative integer or odd)

3 In the relationship "y = 3x + 2", if x = 3, then y = ... (5 or 18 or 9 or 11)

4 If the price of one shirt is 100 pounds, then the price of "K" number of shirts is .... (100K or 100 + K or 100 ÷ K or 100 – K)

5 All the following are a numerical data, except .... (ages or lengths or temperatures or names)

6 The horizontal axis includes numerical periods or intervals in .... (histograms or bar graphs or double bar graphs or dot plots)

7 2^3 = ... (2×2 or 3×3 or $2 + 2$ or 8)

Second: **Complete the following:**

1 All even numbers are divisible by ....2.... .

2 The greatest non-negative integer is ......0...... .

3 If Aser saves "z" pounds per day, then he saves ...7z... pounds in a week.

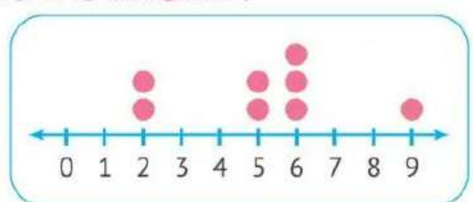
4 If $9x = 36$, then the value of x = ...4...... .

5 In the equation: $3x + 4 = y$, then the dependent variable is ......y...... .

6 $4\frac{5}{6} - 2\frac{1}{2} = 4\frac{5}{6} - 2\frac{3}{6} = 2\frac{2}{6} = 2\frac{1}{3}$

7 The median of the values: 4 , 9 , 7 , 1 , 1 , and 2 is ......3...... .

8 The mode of the values represented on the opposite dot plot is ......6...... .



Third: Choose the correct answer:

1 The coefficient of the algebraic expression: $5ab + 4$ is ...... (2 or 3 or 4 or **5**)

2 0.3 = ... In the form $(\frac{a}{b})$ $(\frac{3}{1}$ or $\frac{10}{3}$ or $\mathbf{\frac{3}{10}}$ or $-\frac{3}{10})$

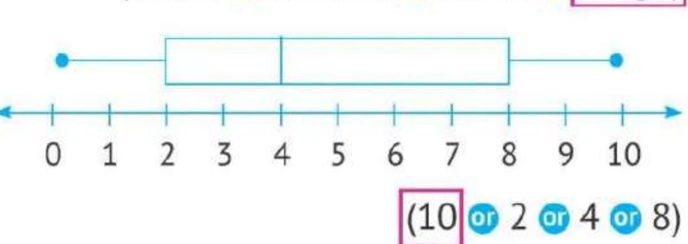
3 If the range of a set of values is 11 and the smallest value is 7, then the greatest value is .... (4 or **18** or 77 or 70)

4 .... is a solution of the inequality $x > 15$. (15 or 12 or 1 or **20**)

5 The opposite of $|-12|$ is .... (**−12** or 12 or 1 or 2)

6 All the following are measures of the central tendency, except .... (mean or median or mode or **range**)

7 The range of the values represented on the opposite box plot is ....



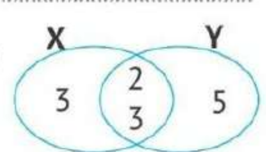
(**10** or 2 or 4 or 8)

Fourth: Answer the following:

1 Evaluate the expression: $x^2 + 8 \div (6 - 4)$ at $x = 3$

$3^2 + 8 \div (6 - 4) = 9 + 8 \div 2 = 9 + 4 = 13$

2 Complete the following using the opposite Venn diagram:



x = ...18...... and Y = ...30......

GCF = ...6...... LCM = ...90......

3 Adam saves 40 pounds every month. If the amount he saves in (x) months is (y) pounds, then:

A The equation that represents this situation is .... $y = 40x$ ....

B Adam saves .... 12 X 40 = 480 .... pounds in a year.

4 Arrange the numbers: 5,2,9,4,3,6,2 ascendingly, then complete:

The order: .... 2 , 2 , 3 , 4 , 5 , 6 , 9 ....

A Minimum value: .... 2 .... B Maximum value: .... 9 ....

C Lower quartile: .... 2 .... D Upper quartile: .... 6 ....

Monufia Governorate – Quesna Educational Zone 7

First: Choose the correct answer:

1 The additive inverse of (−4) is .... (4 or −4 or 0 or 8)

2 The number of integers on the number line is .... (100 or 2 or infinite or 1)

3 .... is divisible by 2 and 3. (23 or 18 or 8 or 21)

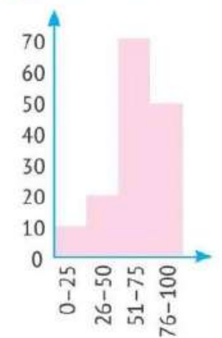
4 − 83 .... natural numbers. (is not a subset of or is a subset of or does not belong to or belongs to)

5 The means of the values 4, 8, 9, 5 and 4 is .... (4 or 6 or 8 or 30)

6 In the opposite histogram.

How many students get more than 50 marks?

(50 or 20 or 70 or 120)



7 .... is a solution of $x < -1$. (3 or 1 or −2 or 0)

Second: Complete the following:

1 The greatest non−positive integer is .... 0 ....

2 .... 12 .... is the smallest 2-digit number that is divisible by 4.

3 3 increased by t equals s in equation is $s = t + 3$.

4 If k +1 = 5, then k − 3 = ...1....

5 18 + 9 = 9 (....2.... + ...1....)

6 If 7 m = 0, then 100 m = ...0.... .

7 In the opposite dot plot the balance point is ..3.. .

8 The outlier value of the following data set is ....94.... .

(22 , 94 , 26 , 24 , 25 , 27 , 21)

Third: Choose the correct answer:

1 The value of the expression "2 + 16 − 3b when b = 4" is ....

(10 or 6 or 2 or 4)

2 The median for the set of values 9 , 19 , 12 , 10 , 5 is ....

(9 or 10 or 5 or 19)

3 The range of the set of values 9 , 4 , 6 , 1 , and 7 is ..... . (9 or 8 or 7 or 1)

4 $x + 3 = 5$, then 3x = ... (5 or 8 or 6 or 1)

5 .... data is written in form of words.

(Numerical or Categorical or Mean or Histogram)

6 The independent variable in the equation "5l − 3 = m" is ....

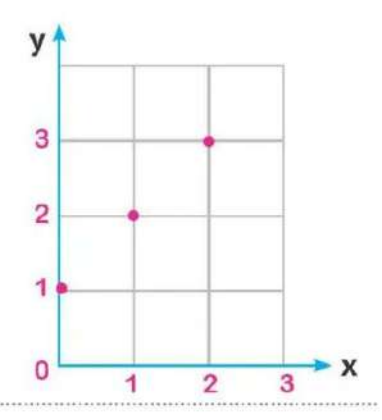
(x or m or l or −3)

7 Eight squared is .... (3^8 or 4^8 or 8^2 or 2 x 8)

Fourth: Answer the following:

1 Complete the table, then represent it graphically, the equation: $y = x + 1$

x	0	1	2
y	1	2	3
(x , y)	(0 , 1)	(1 , 2)	(2 , 3)

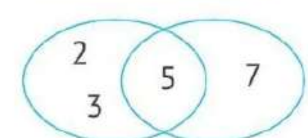


2 Solve:

A 3x = 18 .... $x = 18 \div 3 = 6$

B 6 + y = 13.5 .... $y = 13.5 - 6 = 7.5$

3 Using the opposite Venn diagram, complete:



A The two numbers represented in Venn diagram are ......30...... and ......35...... .

B The GCF of the two numbers is ......5...... .

C The LCM of the two numbers is ....210..... .

4 From the box plot, find:



A The median is ......12...... .

B The upper quartile is ......14...... .

C The lower quartile is ......10...... .

EL Gharbia Governorate – East Educational Zone

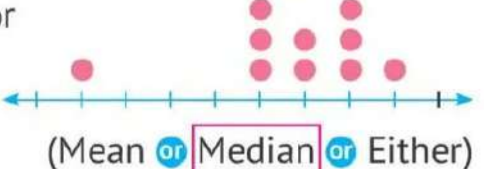


First: **Choose the correct answer:**

1 The GCF of 10 and 8 is .... (2 or 18 or 40 or 80)

2 .... is the smallest number that is divisible by each of 2 and 5. (5 or 10 or 15 or 20)

3 The better measure of central tendency for the opposite data set is ....



(Mean or Median or Either)

4 Which of the following is a solution of the inequality "$m \geqslant -1$"? (-2 or -3 or -4 or 0)

5 " q is six times p added to 12 " the equation is ....

($q = 6p - 12$ or $q = 6p + 12$ or $p = 6q + 12$ or $p = 6q - 12$)

6 The lower quartile for the set of data : 72 , 64 , 79 , 63 , 60 , 75 , 70 , 61 , 77 is .... (61 or 70 or 62 or 76)

7 A set of counting numbers .... of a set of integers.

(belongs to or does not belong to or is a subset of or is not a subset of)

Second: Complete the following:

1. $5\frac{1}{2} + 3\frac{1}{5} =$ ...... $5\frac{5}{10} + 3\frac{2}{10} = 8\frac{7}{10}$ ......
2. The mean of the following values [squares diagram] is ...... 3 ....
3. The value of the expression 3n − 2 for n = 7 is ...... 19 ....
4. The greatest negative integer is ...... -1 ....
5. The outlier value of the following data set is ...... 7,000 ....

   101 , 103 , 105 , 102 , 107 , 106 , 7,000 , 104
6. In the equation: m = 3n + 4, the dependent variable is ...... m ....
7. The GCF of two relatively prime numbers is ...... 1 ....
8. 8 − 3 × 2 ÷ [4 − 2] = ... 5 ......

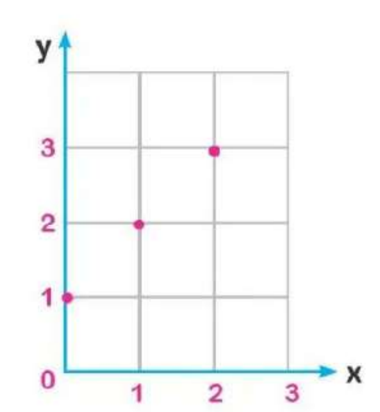
Third: Choose the correct answer:

1. The additive inverse of −2 is .... (− 2 or **2** or 0 or 4)
2. | − 3 | + | 4 | = ... (1 or −7 or **7** or 12)
3. The range of the values: 5 , 9 , 10 , 7 and 4 is .... (5 or **6** or 7 or 10)
4. Wael has x LE, his father gave him 5 LE, then he has .... ($x - 5$ or **$x + 5$** or $5x$ or $\frac{x}{5}$)
5. The common factor of all numbers is .... (0 or **1** or 2 or 3)
6. 3.8 > ...... (4.1 or 5 or **−6.8** or 8.9)
7. 9 (5 + 6) = ... + 54 (**45** or 95 or 96 or 36)

Fourth: Answer the following:

1. Complete the table, then represent it graphically, the equation: $y = x + 1$

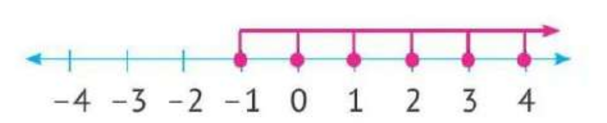
x	0	1	2
y	1	2	3
(x , y)	(0 , 1)	(1 , 2)	(2 , 3)



2 The inequality represented by the opposite number line is

$x > -2$

or $x \geq -1$



3 Arrange in a descending order: −8 , | −7 | , 2 , 0 , −5

|-7| , 2 , 0 , -5 , -8

4 Solve each of the following equations.

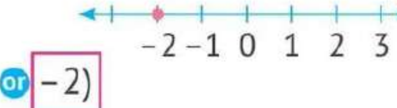
a. 5t = 20	b. 7 + z = 17.8
t = 20 ÷ 5	z = 17.8 − 7
= 4	= 10.8

Port Said Governorate – Port Fuad Educational Zone

9

First: Choose the correct answer:

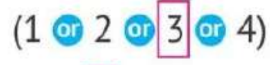
1 On the opposite number line, the integer A is .... (−4 or −5 or −3 or −2)



2 The coefficient in the algebraic expression 2 − 3y + 4 is ....

(2 or 4 or 3y or −3)

3 In the opposite figure, the GCF is .... (5 or 7 or 6 or 1)



4 $\frac{1}{4}$ ☐ $\frac{1}{7}$ (> or < or = or ≤)

5 The smallest number that could be added to 72 to be divisible by 5 is .... (1 or 2 or 3 or 4)

6 The common factor of all numbers is .... (0 or 1 or 2 or 3)

7 The median for the set of data 60, 66, 62, 64, 61, 63 and 65 is ....

(62 or 65 or 61 or 63)

Second: Complete the following:

1. $10 \div 5 + 2^3 - 4 =$ ....6........
2. The distance between 7 and $|-7|$ on the number line is ....0........ .
3. $12 + 6 = 6$ (........2........ + ...1........)
4. If $7x = 0$, then $21x =$ ....0........
5. The absolute values of the two opposites are equal .
6. The outlier of 25 , 3 , 27 , and 29 is ....3........ .
7. The greatest negative integer is ....-1........ .
8. The verbal form of a^2 is a to the power 2 or a squared

Third: Choose the correct answer:

1. x is 4 times y added to 7 in an equation is ....

   ($x + 4y = 7$ or $y + 4x = 7$ or **$x = 4y + 7$** or $y + 7 = 4x$)

2. The number of solutions of the inequality "$x > -4$" in integers is ....

   (4 or -4 or 0 or **infinite**)

3. All the following numbers are rational, except ....

   (3 or $\frac{4}{5}$ or $\frac{2-2}{7}$ or **$\frac{7}{2-2}$**)

4. All the following expressions are equivalent, except ....

   (3 a +6 or 3 (a + 2) or **3 (a + 3)** or $6(\frac{1}{2}a + 1)$)

5. The distance between 0 and -2 on the number line is.................... unit(s).

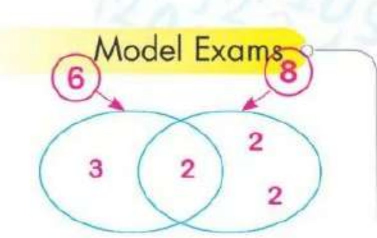
   (0 or **2** or 4 or -2)

6. If the mode of the numbers 3 , $x - 1$, 7 and 9 is 7, then $x =$ ....

   (7 or **8** or 9 or 6)

7. $6\frac{1}{8} + \frac{3}{4} =$ ....

   ($7\frac{3}{4}$ or **$6\frac{7}{8}$** or $6\frac{5}{8}$ or $7\frac{4}{8}$)



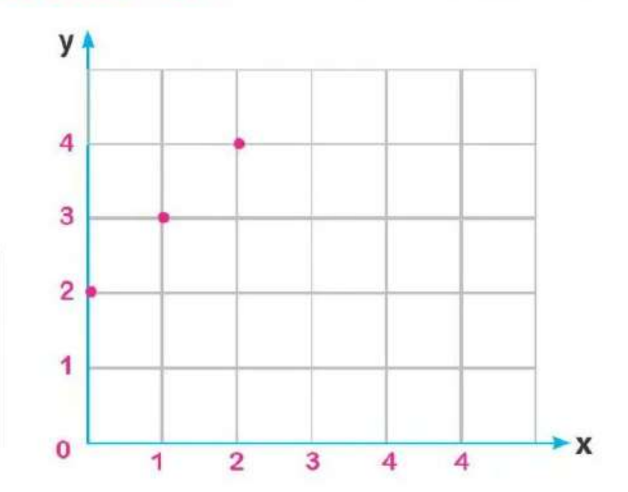
Fourth: Answer the following:

1 Find the LCM of 6 and 8 using the opposite Venn diagram

LCM = 2 X 2 X 2 X 2 X 3 = 24

2 Use the following table to represent it graphically, the equation $Y = x + 2$

x	0	1	2
y	2	3	4
(x , y)	(0 , 2)	(1 , 3)	(2 , 4)



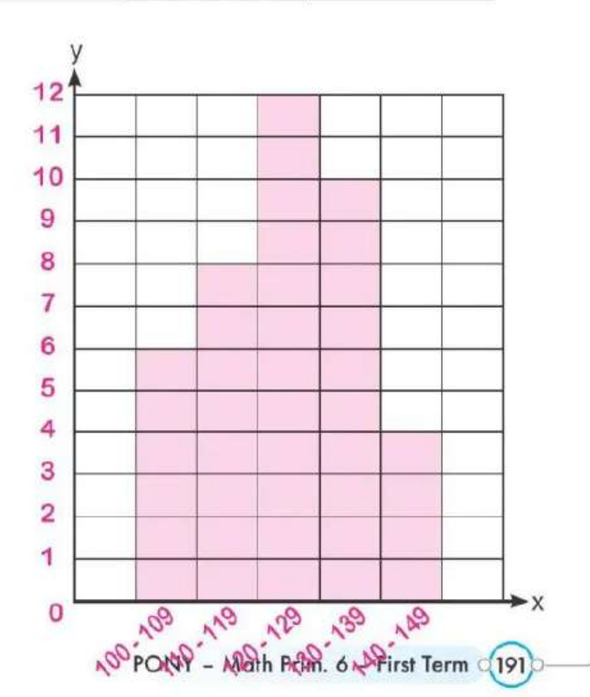
3 Solve the equation : $6m = 42$

$m = 42 \div 6 = 7$

4 The following table represents the lengths of 40 students in a school

Sets	100–109	110–119	120–129	130–139	140–149
Frequency	6	8	12	10	4

Draw the histogram for this distribution:

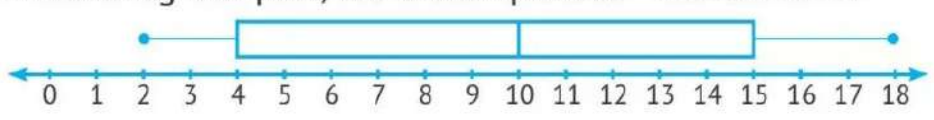


Suez Governorate – Oyun Musa Educational Zone



First: **Choose the correct answer:**

1. The GCF for relatively prime numbers is .... (0 or 1 or 2 or 3)
2. The additive inverse of the number 5 is .... (0 or 0.5 or 5 or –5)
3. In the following box plot, the lower quartile = ...



(2 or 4 or 10 or 15)

4. The type of graph that represents individual data values is the ....

(bar graph or histogram or box plot or dot plot)

5. In the algebraic expression 7 + 3x the coefficient is ....

(7 or 3x or 3 or –7)

6. If 10 = 2Y, then Y = ... (5 or 8 or 3 or 12)
7. What is the favorite color of each student in your class? The type of answer to this question is .... data.

(categorical or numerical or non-statistical or otherwise)

Second: **Complete the following:**

1. 5 (2 + 3) = (......5...... x ......2......) + (......5...... x ......3......)
2. On the number line, the number that comes just before –7 is .....-8...... .
3. The outliers for the data values 7 , 3 , 6. 7 , 3 , 37 , and 7 is .....37..... .
4. The opposite sign shows the sale prices of one shop. Then the lowest price in this shop is ...75 L.E.. .

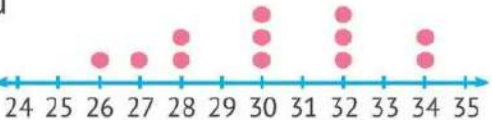
SALE
Starting
at
75 L.E

5 The rational number $1\frac{3}{4}$ in the fraction form $\frac{a}{b}$ is $\frac{7}{4}$.

6 The value of the expression ($x^3 - 5$) ÷ 3 for $x = 2$ is 1 .

7 The area of square depends on its side length

8 The range of the data values represented on the opposite dot plot is 34 – 26 = 8



Third: Choose the correct answer:

1 The LCM for 6 and 8 is .... (2 or 12 or **24** or 48)

2 The mean of the numbers 5 , 3 , 8 , 1 , and 3 = ... (3 or 8 or 5 or **4**)

3 The smallest number could be added to 36 to be divisible by 10 is .... (1 or 2 or 3 or **4**)

4 In the number 2^3, the base = ... (8 or **2** or 3 or 6)

5 –4 .... | –3 | (**<** or > or = or Otherwise)

6 In the equation y = 6x – 2 the variable y represents the .... number. (input or **output** or independent or otherwise)

7 The algebraic expression which is equivalent to 2($x - 5$) is .... (**$2x - 10$** or $x - 10$ or $2x - 5$ or $2x - 3$)

Fourth: Answer the following:

1 Solve the equation: 3 + y = 8

y = 8 – 3 = 5

2 A Write the verbal expression that represents 5y +4

5 times y added to 4

B Write the algebraic expression that represents a "number is decreased by 2"

$x - 2$

3 A Using variables x and y where x is independent, write the equation that represents the relationship in the opposite table

x	5	7	8	10	....
y	2	4	5	....	11

the equation : $y = x - 3$

4 Use the opposite histogram to complete the table and the graph

Intervals	Frequency
0 – 19	3
20 – 39	5
40 – 59	7
60 – 79	9
80 – 99	8



Al Dakahlia Gavernorate



First: Choose the correct answer:

1 The common factor for all numbers is .... (0 or **1** or 2 or 3)

2 The remainder of 630 ÷ 25 = ... (30 or 25 or 15 or **5**)

3 $\frac{3}{5} - \frac{1}{2} =$ .... ($\frac{2}{3}$ or $\frac{1}{5}$ or $\mathbf{\frac{1}{10}}$ or $\frac{4}{7}$)

4 The coefficient of the algebraic term 4k is .... (1 or k or **4** or −4)

5 The outlier of a data set 47 , 45 , 49 , 43 , and 125 is ....

(82 or **125** or 43 or 48)

6 The expression which represents (number Y add to 5) is ....

(**y + 5** or y − 5 or 5y or $\frac{y}{5}$)

7 $-\frac{3}{7}$ ☐ zero (< or = or **<** or ≥)

Second: Complete the following:

1. $|-7|$ = ...7......
2. The exponent of 6^2 is ......2...... .
3. The additive inverse of the number 11 is ......-11...... .
4. The constant in the expression: 5 Y + 3 is ......3...... .
5. If Y = x − 5 and x = 8, then Y = ...3......
6. The mode of (8 , 5 , 3 , 8 , 9 , 4) is ......8...... .
7. The number of terms of the expression: 3a + 2b + 5 is ......3...... terms.
8. The number 108 is divisible by the two prime numbers 3 and ......2...... .

Third: Choose the correct answer:

1. The following data are numerical, except ....

   (heights or weights or **blood types** or ages)

2. x > 8 represents a/an ...... (equation or expression or **inequality** or verbal)

3. The independent variable in relation : x + 2 = y is .... (**x** or y or 2 or 1)

4. In the opposite box plot,

   0 1 2 3 4 5 6 7 8 9 10

   the third quartile is ....

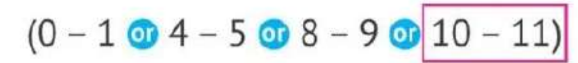
   (1 or 2 or 4 or **6**)

5. 10^3 = ... (10 or 100 or **1,000** or 0.001)

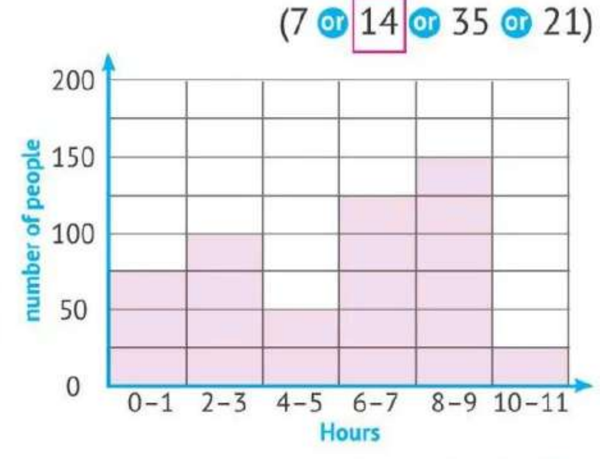
6. The first quartile for the values 42 , 35 , 63 , 7, 28 , 21 , and 14 is ....

   (7 or **14** or 35 or 21)

7. In the opposite histogram, the interval having the least frequency is ....

   (0 – 1 or 4 – 5 or 8 – 9 or **10 – 11**)



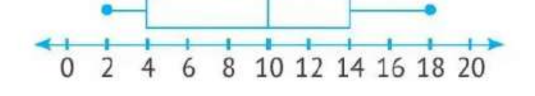
Fourth: Answer the following:

1. In the opposite Venn diagram:



The GCF = 2 X 5 = 10 The LCM = 5 X 5 X 2 X 3 =150

2. In the opposite box plot



The median = 10

The range = 18 – 2 = 16

3. Find the result of: $(20 - 5) + 4 \times 3^2 \div 6$

$(20 - 5) + 4 X 9 \div 6 = 15 + 4 X 9 \div 16$

$= 15 + 36 \div 6 = 15 + 6 = 21$

4. Solve the equation: $x + 2 = 7$

$x = 7 - 2 = 5$

Damietta Governorate – Ras El Bar Educational Zone 12

First: Choose the correct answer:

1. The prime factors of 12 are .... (2 x 6 or 1 x 12 or 3 x 4 or **2 x 2 x 3**)
2. In the algebraic expression 5 b + 6 the constant is ....

(5 or 5b or **6** or b)

3. 3^2 ☐ 2^3 (< or **>** or = or ≤)
4. The best graph to represent the number of pupils whose height range from 150–160 cm is a ....

(dot plot or bar graph or **histogram** or box plot)

5. The algebraic expression representing twice the difference between the number **a** and 7 is .... (a – 7 or 2a +7 or **2 (a – 7)** or 2 (a – 7))
6. The median of the values 4 , 9 , 7 , 1 , 1 , and 2 .... (4 or 2 or 24 or **3**)
7. Like terms of algebraic expression 5 + 5y + 2y are ....

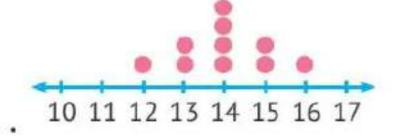
(5 , 5y or **5y , 2y** or 5 , 2y or 5+ 5y + 2y)

Second: Complete the following:

1. The largest negative integer is ....-1.... .
2. The smallest number that could be added to 83 to be divisible by 3 is ....1.... .
3. The coefficient in the algebraic term 3 x y is ....3.... .
4. 3 = |a|, then a = ...3.... or ....-3.... .
5. The value of the expression $a^2 + 6$, if a = 3 is ....15.... .
6. 6X (7 + 5) = (....6.... X ....7....) + (....6.... X ....5....)
7. $4 \times 4 \times 4 = 4^{3}$
8. The mode of values 5 ,3 , 2 , 5 , 7 , 5 is ....5.... .

Third: Choose the correct answer:

1. .... is neither a positive nor a negative number. (0 or 1 or −1 or 10)
2. The inequality that represents all values less than or equal to −2 is .... ($x > -2$ or $x < -2$ or $x \leqslant -2$ or $x \geqslant -2$)
3. The balanced point of the set of data which is represented on the opposite dot plot is ....



(12 or 13 or 14 or 15)

4. $3^2 - 16 \div 8 =$ .... (7 or 9 or 8 or 3)
5. If 5x = 40 , then x = ... (35 or 45 or 8 or 200)
6. The range of a set of values 9 , 4 , 8 , 1 and 3 is .... (4 or 6 or 8 or 9)
7. If the sum of 8 values equals 48, then the mean of these values is .... (40 or 56 or 24 or 6)

Fourth: Answer the following:

1. Find the GCF and LCM of 16 and 24

A 24 = ...2 X 2 X 2 X 3.... **B** 16 = ...2 X 2 X 2 X 2....

C The GCF = ...2 X 2 X 2 = 8.... **D** The LCM = ...2 X 2 X 2 X 2 X 3 = 48....

2 Ahmed has $5\frac{3}{4}$ LE and Tamer has $15\frac{1}{2}$. Find out what they have all together.

$5\frac{3}{4} + 15\frac{1}{2} = 5\frac{3}{4} + 15\frac{2}{4} = 20\frac{5}{4} = 21\frac{1}{4}$

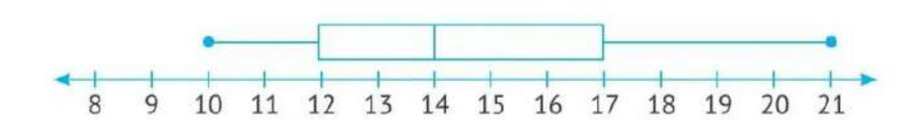
3 Complete the opposite table according to the equation y = 2x + 1

x	0	2	4	5
y	1	5	9	11

4 From the following box plot, find:

A The median = 14 B The lower quartile Q1 = 12

C The upper quartile Q3 = 17 D The range = 21 – 10 = 11



Alexandria Gavernorate – Al Montazah Educational Zone (3)

13

First: **Choose the correct answer:**

1 2 x 2 x2 = 2...... (1 or 2 or 3 or 4)

2 If x + 5 = 7, then x = ... (35 or 12 or 7 or 2)

3 The median of the values 2 , 3 , 5 , 7 and 1 is .... (1 or 2 or 3 or 5)

4 | – 7 | > .... (| – 6 | or | – 7 | or | – 8 | or | – 9 |)

5 The data which represents numerical data is ....

(blood types or birth places or ages or favorite colors)

6 The coefficient in the expression "6x + 3" is .... (6 or 3 or 9 or 18)

7 The algebraic expression representing "subtract 4 from twice the number x" is .... (x – 4 or 2x – 4 or 4x + 2 or 2x)

Second: Complete the following:

1. The value of the expression "2a + 1, if a = 3" is ......7...... .
2. The mode of 2 , 3 , 2 , 4 , 2 , 3 is ......2...... .
3. If y = 6 – 4 then 2y = ...4......
4. $-1\frac{1}{2}$ in the form $\frac{a}{b}$ is ...... $-\frac{3}{2}$ ....
5. 15 + 25 = 5 (3 + ...5......)
6. The integers between – 2 and 1 are ...-1 , 0... .
7. The range = ...the greatest value...... – the smallest value.
8. The smallest solution of the inequality $x \geqslant -3$ is ......-3...... .

Third: Choose the correct answer:

1. The mean of data set (2 , 10 , 20 , 8) is .... (15 or **10** or 20 or 8.5)
2. Which of the following is an algebraic expression?
   ($3^2 - 6$ or **5x + 4** or $28 - 3^3$ or 3(3+9))
3. The outlier in the set of values 9 , 6 , 8 , 7 , 5 , 60 is ....
   (6 or **60** or 5 or 7)
4. The first operation you perform in $20 \div 5 + (7 - 2)^2$ is ....
   (adding or **subtracting** or exponent or dividing)
5. All negative numbers ☐ zero (**<** or = or > or ⩾)
6. The independent variable in the equation $x = 3y - 2$ is ....
   (x or **y** or 3 or 2)
7. The range of the set of values 2 , 5 , 6 , 3 is .... (2 or 3 or **4** or 5)

Fourth: Answer the following:

1. Solve: y + 6 = 7

   y = 7 – 6 = 1

2. Find the value: $y^2 - 24 \div 8$ at y = 3

   $3^2 - 24 \div 8 = 9 - 24 \div 8 = 9 - 3 = 6$

3. Using the Venn diagram, find the GCF and LCM for 12 , 15

   GCF = 3

   LCM = 2 X 2 X 3 X 5 =60



4 From the box plot:

A The minimum value = 1

B The maximum value = 8

C The median = 4 D The range = 8 – 1 = 7

Kafr El -Shiekh Gavernorate - Desouk Educational Zone 14

First: Choose the correct answer:

1 Two times the sum of k and 5 is ....

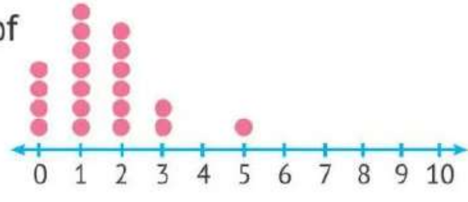
(2 + 5k or 5k – 2 or 2(k + 5) or 5k – 2)

2 The mode of the values 0,1,4,7,0,0,9,12,7, 11 is .... (0 or 1 or 2 or 11)

3 The common factor of the two relatively prime numbers is ....

(0 or 1 or 2 or 3)

4 The opposite dot plot shows the number of movies seen at the theater last month. How many people were surveyed?

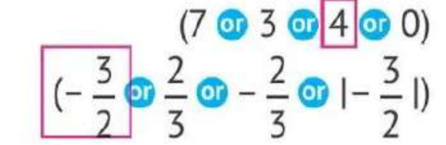


(1 or 9 or 10 or 20)

5 The ordered pair (0 , ...) satisfies the equation y = 3x + 4.

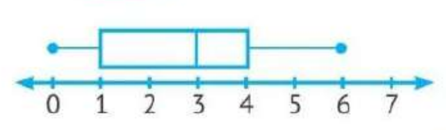
(7 or 3 or 4 or 0)

6 The opposite of $\frac{3}{2}$ is ....



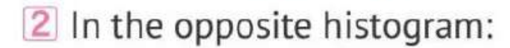
$(-\frac{3}{2}$ or $\frac{2}{3}$ or $-\frac{2}{3}$ or $|-\frac{3}{2}|)$

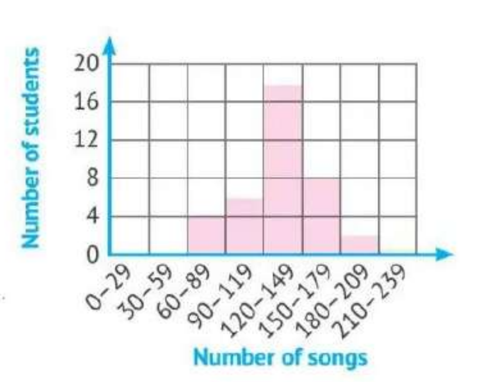
7 From the opposite box plot, the range ....



(0 or 1 or 3 or 6)

Second: Complete the following:

1. 
$\frac{5}{6} + \frac{3}{8} =$ $\frac{29}{24} = 1\frac{5}{24}$



2. In the opposite histogram:

   the most common interval is 120 – 149

3. The absolute value of any two opposites are equal .
4. The number of integers between −3 and 2 is 4 .
5. The solution of the equation $x + 5 = 11$ is 6 .
6. The independent variable in the equation S = 3t +2 is t .
7. The outlier of the set of data 3 , 4 , 99 , 5 , 6 , 5 is 99 .
8. If $2^3 = 8$, then the exponent is 3 .

Third: Choose the correct answer:

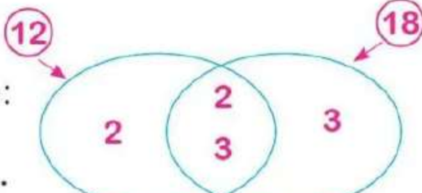
1. The best subset of the number (−11) is ....

   (counting or integer or natural or rational)
2. If y = 2x , so : if $x = 2.3$, then y would be .... (22.3 or 2.5 or 4.3 or 4.6)
3. The mean of the values 4 , 10 , 16 , 20 , and 5 is ....(10 or 11 or 55 or 5)
4. .... is divisible by 3. (123 or 303 or 503 or 635)
5. The inequality that represents the following graph is ....

   -3 -2 -1 0 1 2 3 ($x > -1$ or $x \geq -1$ or $x \leq -1$ or $x < -1$)
6. The median of 1 , 2 , 2 , 3 , 5 , 7 , and 8 is .... (2 or 3 or 4 or 5)
7. In the expression ($7 + 5 + x$), the coefficient is ....(1 or 5 or 7 or 12)

Fourth: Answer the following:

1 Using the opposite Venn diagram, complete:



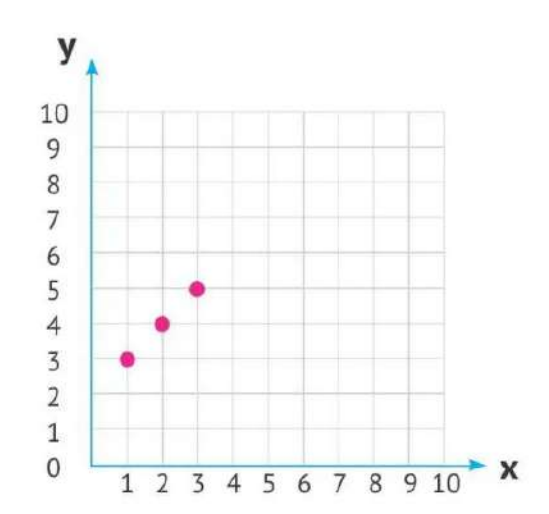
A The GCF of 12 and 18 is 2 X 3 = 6 .

B The LCM of 12 and 18 is 2 x 2 X 3 X 3 = 36 .

C 12 + 18 = 6 (2 + 3)

2 Using the equation: Y = x + 2,
complete the following table ,
then make the graph.

x	1	2	3
y	3	4	5
Points	(1 , 3)	(2 , 4)	(3 , 5)



3 Evalute the expression 7 + 6 (x^2 – 3) for x = 2

$7 + 6 (2^2 + 3) = 7 + 6 X (4 – 3)$

$= 7 + 6 X 1 = 7 + 6 = 13$

4 Draw the box plot for the data set: 2 , 7 , 4 , 18 , 14 , 9 , 12 , 11 , 13 , 17 , 15

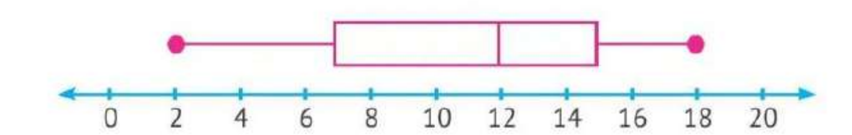
The order: 2 , 4 , 7 , 9 , 11 , 12 , 13 , 14 , 15 , 17 , 18

A Min = 2

B Q1 = 7

C Median = 12

D Max = 18



Model Exams Guide Answers

1 Cairo Governorate – El Maadi Educational Zone

First

1. 6
2. $<$
3. rational
4. 10
5. 11
6. 3
7. 1

Second

1. (7 x 5) + (7 x 3)
2. $\frac{3}{5}$
3. 7
4. y
5. 3 times the number k is 12
6. 25
7. 4
8. 5

Third

1. K+3
2. 1
3. 4
4. 8
5. 52
6. 4
7. 4
8. 6

Fourth

1. (9 – 5) + 7 x 2 = 4 + 7 x 2 = 4 + 14 = 18
2. Y = 2 x 5 + 1 = 10 + 1 = 11
3. A a = 6 b = 15 B 3 C 30
4. A 4 B 7 C 8 D 6

2 Cairo Governorate – Al Basatin Educational Zone

First

1. $>$
2. natural
3. 11
4. 5
5. 2
6. 5+ 4 n
7. 9 x 9 x 9

Second

1. 54
2. 12
3. 4
4. –6.5
5. $\frac{5}{8}$
6. 12
7. 10
8. 1

Third

1. n
2. $<$
3. 5
4. –5
5. 4 (x + 4)
6. 4 (5 – 2)
7. 20 – 29

Fourth

1. A 4 B 24
2. 6 , 12 , y =3x
3. No, because 460 is divisible by 10
4. A 30 B 27 C 33 D 10

3 Giza Governorate – El Ayyat Educational Zone

First

1. 5
2. 3
3. 1
4. 5 x 5 x 5 x 5
5. 0
6. | –7 |
7. 3

Second

1. 12
2. greatest value – smallest value
3. 4
4. 2
5. 5
6. categorical, numerical
7. $\frac{7}{7} = 1$
8. 2

Third

1. 6^3
2. 3
3. x
4. 5
5. 45
6. 3
7. 5x +3

Fourth

1. GCF= 4
2. –2 , –3 , –4

12 | 16
3 | 2, 2 | 2, 2

3. $40 + 5 (9 - 5) - 10 = 40 + 5 \times 4 - 10$
$= 40 + 20 - 10 = 60 - 10 = 50$

4. The order: 3 , 4 , 5 , 6 , 7 ,8 , 9 , 10 , 12 , 13 , 14
   - A Min: 3
   - B Q1: 5
   - C Median: 8
   - D Q3: 12
   - E Max: 14 draw by your self

Alexandria Governorate – El Montazah Educational Zone(1) — 4

First

1. 0
2. 5
3. 7
4. 2
5. 12
6. 6
7. y

Second

1. 8
2. $3^2 = 9$
3. 10
4. $5\frac{9}{14}$
5. 3
6. (9+2)
7. $-\frac{15}{10}$
8. 10

Third

1. s = 5y
2. histogram
3. <
4. 6
5. is a subset of
6. 2
7. 94

Fourth

1. A 55 B 80 C 45 D 75
2. Solutions: 0 , 1 , 2 draw by your self
3. A 42 , 30 B 6 C 210
4. A $10 + (25 - 8) = 10 + 17 = 27$
   B $24 \div 6 + 5 = 4 + 5 = 9$

Alexandria Governorate– EL Montazah Educational Zone(2) — 5

First

1. $4\frac{4}{5}$
2. $n \geqslant 7$
3. $7^3 + 5$
4. 75
5. −1.3
6. 0
7. 2,1

Second

1. 2
2. x−3
3. 10
4. 5
5. q = 8 + l
6. 19
7. 3
8. 40

Third

1. 4 and 9
2. 94
3. 62
4. <
5. 4
6. 6
7. X + 9

Fourth

1. Order : 5 , 3.25 , $\frac{3}{4}$, −2.3 , −275
2. x = 7 − 5 = 2
3. GCF = 1
4. A 3
   B 11

El Behira Gavernorate – Damanhour Educational Zone — 6

First

1. 3.17
2. natural
3. 11
4. 100K
5. name
6. histogram
7. 8

Second

1. 2
2. 0
3. 7z
4. 4
5. y
6. $2\frac{1}{3}$
7. 3
8. 6

Third

1. 5
2. $\frac{3}{10}$
3. 18
4. 20
5. –12
6. range
7. 10

Fourth

1. $3^2 + 8 \div (6 - 4) = 32 + 8 \div 2 = 9 + 8 \div 2$
   $= 9 + 4 = 13$
2. X= 18 , y = 30 GCF = 6 LCM= 90
3. A Y = 40x B y = 40 x 12 = 480 pounds
4. The order: 2 , 2 , 3 , 4 , 5 ,6 , 9
   A 2 B 9 C 2
   D 6

Monufia Governorate – Quesna Educational Zone 7

First

1. 4
2. infinite
3. 18
4. does not belong to
5. 6
6. 120
7. –2

Second

1. 0
2. 12
3. s = 3 + t
4. 1
5. 2,1
6. 0
7. 3
8. 94

Third

1. 6
2. 10
3. 8
4. 6
5. categorical
6. l
7. 8^2

Fourth

1. 1 , 2 , 3 (1,2) , (2,3) represent by your self
2. A x = 18 ÷ 3 = 6
   B Y = 13.5 – 6 = 7. 5
3. A 30 , 35 B 5 C 210
4. A 12 B 14 C 10

EL Gharbia Governorate – East Educational Zone 8

First

1. 2
2. 10
3. median
4. 0
5. q = 6p + 12
6. 62
7. is a subset of

Second

1. $8\frac{7}{10}$
2. 3
3. 19
4. –1
5. 7,000
6. m
7. 1
8. 5

Third

1. 2
2. 7
3. 6
4. x + 5
5. 1
6. –6.8
7. 45

Fourth

1. 1 ,2 , 3 (0,1) , (1,2) , (2,3)
2. x > –2 or x ⩾ –1
3. |–7| , 2 , 0 , – 5 , – 8
4. A T = 20 ÷ 5 = 4 B z = 17.8 – 7 = 10.8

Port Said Governorate – Port Fuad Educational Zone 9

First

1. –2
2. –3
3. 1
4. >
5. 3
6. 1
7. 63

Second

1. 6
2. 0
3. 2,1
4. 0
5. equal
6. 3
7. –1
8. a squared

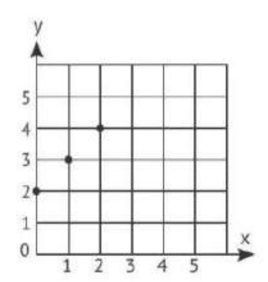
Third

1. x = 4y + 7
2. infinite

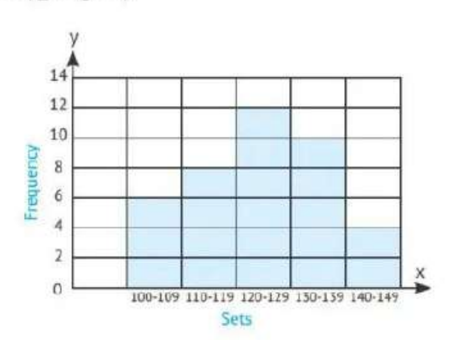
3. $\frac{7}{(2-2)}$
4. 3 (a + 3)
5. 2
6. 8
7. $6\frac{7}{8}$

Fourth

1. LCM = 24



2. m = 42 ÷ 6 = 7



Suez Governorate – Oyun Musa Educational Zone 10

First

1. 1
2. –5
3. 4
4. dot plot
5. 3
6. 5
7. categorical

Second

1. (5 x 2) + (5 x 3)
2. –8
3. 37
4. 75
5. $\frac{7}{4}$
6. 1
7. side length
8. 8

Third

1. 24
2. 4
3. 4
4. 2
5. <
6. output
7. 2 x – 10

Fourth

1. y = 8 – 3 = 5
2. A 4 added to5 times number y B x–2
3. Y = x–3
4. By your self

Al Dakahlia Gavernorate 11

First

1. 1
2. 5
3. $\frac{1}{10}$
4. 4
5. 125
6. y + 5
7. <

Second

1. 7
2. 2
3. –11
4. 3
5. 3
6. 8
7. 3
8. 2

Third

1. blood type
2. inequality
3. x
4. 6
5. 1000
6. 14
7. 10 – 11

Fourth

1. GCF = 10 , LCM = 150
2. 10 , 16
3. 15 + 4 x 9 ÷ 6 = 15 + 3 6 ÷ 6 = 15 + 6 = 21
4. X = 7 – 2 = 5

Damietta Governorate – Ras El Bar Educational Zone 12

First

1. 2 x 2 x 3
2. 6
3. >
4. histogram
5. 2 (a – 7)
6. 3
7. 5y , 2y

Second

1. -1
2. 1
3. 3
4. $-3, 3$
5. 15
6. $(6 \times 7) + (6 \times 5)$
7. 3
8. 5

Third

1. 0
2. $x \leqslant -2$
3. 14
4. 7
5. 8
6. 8
7. 6

Fourth

1. A $2 \times 2 \times 2 \times 3$ B $2 \times 2 \times 2 \times 2$
   C GCF = 8 D LCM = 48
2. $5\frac{3}{4} + 15\frac{1}{2} = 21\frac{1}{4}$
3. 1, 5, 9, 11
4. A 14 B 12
   C 17 D 11

Alexandria Gavernorate – Al Montazah Educational Zone (3) 13

First

1. 3
2. 2
3. 3
4. $|-6|$
5. age
6. 6
7. $2x - 4$

Second

1. 7
2. 2
3. 4
4. $-\frac{3}{2}$
5. 5
6. $-1, 0$
7. greatest value
8. -3

Third

1. 10
2. $5x + 4$
3. 60
4. subtract
5. <
6. y
7. 4

Fourth

1. $Y = 7 - 6 = 1$
2. $9 - 24 \div 8 = 9 - 3 = 6$
3. $12 = 2 \times 2 \times 3$ $15 = 3 \times 5$
   GCF = 3 LCM = 60
4. A 1 B 8 C 4
   D 7

Kafr El -Shiekh Gavernorate - Desouk Educational Zone 14

First

1. $2(k + 5)$
2. 0
3. 1
4. 20
5. 4
6. $-\frac{3}{2}$
7. 6

Second

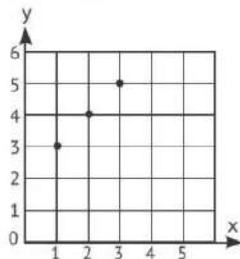
1. $\frac{29}{24} = 1\frac{5}{24}$
2. 120–149
3. equal
4. 4
5. 6
6. t
7. 99
8. 3

Third

1. integer
2. 4.6
3. 11
4. 123
5. $x > -1$
6. 3
7. 1

Fourth

1. A GCF = 6 B LCM = 36 C $6(2 + 3)$
2. 3, 4, 5, (1,3), (2,4), (3,5)



3. $7 + 6(4 - 3) = 7 + 6 \times 1 = 7 + 6 = 13$
4. The order: 2, 4, 7, 9, 11, 12, 13, 14, 15, 17, 18
   A 2 B 7 C 12
   D 18